

The AMSAT[®] Journal

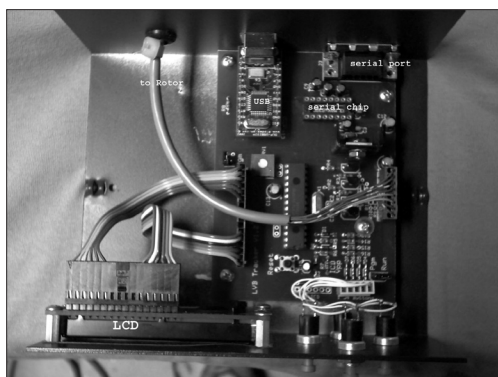


Editor-in-Chief:
Ed Long, WA4SWJ

Assistant Editor:
Bill Hook, W3QBC

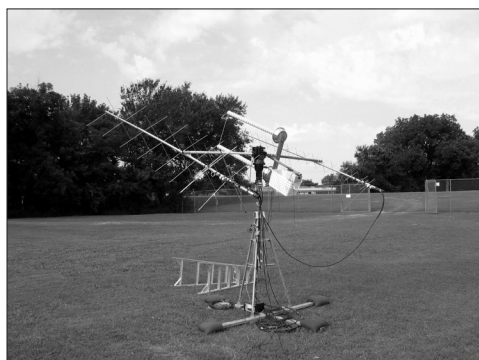
Volume 30, Number 4

July/August 2007



**Need a new antenna
tracker system?
Check this out.**

**Is there a helix
in your future?**



**Love those Field Day
antennas!**

AMSAT-NA
850 Sligo Avenue, Suite 600
Silver Spring, MD 20910-4730

Periodicals

POSTAGE PAID

At Silver Spring, MD
and at additional
mailing offices

in this issue

AMSAT Announcements	2
Apogee View	3
<i>by Rick Hambly • W2GPS</i>	
Additional Real World Antenna.....	5
Comparison Measurements	
<i>by Clare Fowler • VE3NPC</i>	
Blast Off.....	7
<i>by Dee Interdonato • NB2F</i>	
2007 AMSAT Space	8
Symposium Update	
<i>by Barry Baines • WD4ASW</i>	
The LVB Tracker Box.....	10
<i>by Gould Smith • WA4SXM</i>	
The Orbital Classroom.....	13
"Morse Code Redux"	
<i>by H. Paul Shuch • N6TX</i>	
AMSAT Eagle Update	17
<i>by James A. Sanford • WB4GCS</i>	
AMSAT at the 2007 Rochester.....	18
Hamfest	
<i>by Richard F. Crow • N2SPI</i>	
Learn DSP by Programming.....	21
Your PC, Part 1	
<i>by Richard F. Crow • N2SPI</i>	
Field Day Report.....	27
<i>by Bruce Paige • KK5DO</i>	
Blind Man Experiences	29
Satellites	
<i>by Maurice-Andre Vigneault • VE3VIG</i>	
Morse for the Fun of It.....	30
<i>by Ray Soifer • W2RS</i>	
AMSAT Telemetry	31
AMSAT-UK Beginners Workshop	
<i>JPL Acknowledges Voyager Reception</i>	

How You Can Help Build New and Exciting Satellites

Donate to the President's Club

Gold, Silver, Bronze and Core levels are available to match your ability to participate.

Cash Gifts

Visa, or MasterCard or checks are accepted. And, you can specify how your contribution is to be used.

Gift of Life Insurance

US taxpayers may be able to receive a significant income tax deduction by making The Radio Amateur Satellite Corporation the owner and beneficiary of life insurance policies.

Gift of Stocks or other Securities

US taxpayers should be able to avoid capital gains taxes on appreciated securities and receive a deduction for their fair market value.

Bequest

A codicil in your will, naming The Radio Amateur Satellite Corporation as a beneficiary will help insure the continuance of the Amateur Radio Satellite program.

Call the AMSAT-NA office at 301-589-6062 for questions on any or all of these ways you can help build new and exciting satellites.

Support AMSAT-NA

AMSAT Announcements

AMSAT Symposium in Pittsburgh, PA

There are several pages of information this issue on the Symposium. Make your plans and reservations now!

G6LVB Tracker

AMSAT is also offering the G6LVB antenna tracker box. See details in this issue.



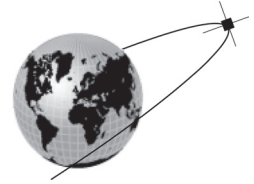
AMSAT's Mission

AMSAT is a non-profit volunteer organization which designs, builds and operates experimental satellites and promotes space education. We work in partnership with government, industry, educational institutions and fellow Amateur Radio societies. We encourage technical and scientific innovation, and promote the training and development of skilled satellite and ground system designers and operators.

AMSAT's Vision

Our Vision is to deploy high earth orbit satellite systems that offer daily coverage by 2009 and continuous coverage by 2012. AMSAT will continue active participation in human space missions and support a stream of LEO satellites developed in cooperation with the educational community and other amateur satellite groups.





Radio Amateur Satellite Corporation (AMSAT-NA)
850 Sligo Ave., Silver Spring, MD 20910-4703
Telephone: 301-589-6062 – Toll Free: 888-322-6728
Facsimile: 301-608-3410
AMSAT-NA Club Callsign: W3ZM
AMSAT-NA Web site: <http://www.amsat.org>

The AMSAT Journal Staff

Editor-in-Chief: Ed Long, WA4SWJ, wa4swj@amsat.org
Assistant Editor: Bill Hook, W3QBC
Circulation: Martha Saragovitz, martha@amsat.org

AMSAT-NA Board of Directors

Barry Baines, WD4ASW, wd4asw@amsat.org
Tom Clark, K3IO, k3io@amsat.org
Emily Clarke, N1DID, n1did@amsat.org
Rick Hambly, W2GPS, w2gps@amsat.org
Lou McFadin, W5DID, w5did@amsat.org
Bob McGwire, N4HY, n4hy@amsat.org
Gunter Meisse, W8GSM, w8gsm@amsat.org

AMSAT-NA Senior Officers

President: Richard Hambly, W2GPS
Executive Vice-President: Lee McLamb, KU4OS
Treasurer: Gunther Meisse, W8GSM
Corporate Secretary & VP Special Projects:
Barry Baines, WD4ASW
Manager: Martha Saragovitz
Vice-President, Engineering: Bob McGwier, N4HY
Vice-President, Operations: Drew Glasbrenner, KO4MA
Vice President, Marketing and User Services: Open

Honorary Positions

Immediate Past President: Robin Haighton, VE3FRH
President Emeritus: Tom Clark, K3IO
Founding President: Perry Klein, W3PK

Editorial Office: Ed Long, WA4SWJ, 6685 Southeast 108th Street, Belleview, FL, 34420-3449. Please e-mail Journal submissions to: journal@amsat.org. **Advertising Office:** AMSAT-NA Headquarters, 850 Sligo Avenue, Suite 600, Silver Spring, MD 20910-4703.

The AMSAT Journal (ISSN: 1407-3076) is published bi-monthly (Jan/Feb, Mar/Apr, May/Jun, Jul/Aug, Sep/Oct, Nov/Dec) by AMSAT-NA, 850 Sligo Avenue, Suite 600, Silver Spring, MD 20910-4703. Telephone: 301-589-6062, fax: 301-608-3410. Periodicals postage paid at Silver Spring, MD and additional mailing offices.

Postmaster: Send address changes to *The AMSAT Journal*, 850 Sligo Avenue, Suite 600, Silver Spring, MD 20910-4703.

Opinions expressed in *The AMSAT Journal* are those of the article authors and are not necessarily those of AMSAT-NA. Copyright © 2007 by AMSAT-NA, The Radio Amateur Satellite Corporation. AMSAT is a registered trademark. Reproduction of material from *The AMSAT Journal* by mechanical, electronic, photocopy or other means is prohibited unless written permission is obtained from the author.

The AMSAT Journal staff is always interested in article submissions. Whenever possible, submissions should be sent via e-mail to journal@amsat.org using plain text or word processor files; photos or figures in TIF, GIF or JPEG formats. AMSAT-NA reserves the right to select material for *The AMSAT Journal* based on suitability of content and space considerations. The editors of this publication are volunteers giving freely of their talents, time and efforts to produce *The AMSAT Journal*.

The Future of AMSAT and the Amateur Satellite Service

AMSAT membership consists broadly of three groups; those who operate satellites, those who build satellites and those who support these activities through their membership and contributions. In the United States there are over 650,000 licensed hams while in Canada there are about 44,000 hams and Mexico has about 7,000. That's a pool of over 700,000 hams in the North American region, not to mention the many hams in other regions that also join AMSAT-NA. From this pool of licensed hams, AMSAT attracts only about 0.6% as dues paying members.

There are many theories why our membership is so low. Many of these hams just do not join any group. The information I have suggests that at least one quarter of them join some group, mostly ARRL. So let's say that our pool of licensed hams who are likely to join some group is 175,000. That means that AMSAT has attracted only 2.3% of this prime group.

What can AMSAT do to make our specialized part of ham radio more attractive to the hams that are not members and are not using satellites? I have my list and I'm sure many of you have yours. I would like to hear your ideas. Here are some of mine:

- Make satellites more accessible and easier to use.
- Make the experience of operating a satellite more satisfying.
- Provide valuable services over satellite; not just a repeater in the sky.
- Use our experiences and expertise to promote science and technology in education.

To make satellites more accessible we must provide services that allow high quality access to satellites without having to wait for a satellite to come into view and without the need for large antennas with expensive and complex means to steer them. I know that the favorite operating modes of many existing members, such as Mode U/V (B) on both low and high elliptical orbit satellites, involve dealing with both of these issues and these operators derive much satisfaction from the experience. But there are many more hams out there that are stopped from participating by the high cost vs. benefit brought about by these same issues.

The limited capability and short time in view

make satellites like AO-51 more difficult to work and the resulting contacts are more like a contest in their difficulty and brevity. There is a sense of satisfaction for many loyal satellite users in succeeding with such contacts but many more hams tell me it is not worth the effort for them. They want to get to know people and have extended contacts without taking over the entire satellite.

Satellites are uniquely capable of providing some types of services that are difficult or impossible to provide in other ways, and that is especially true for satellites in the amateur satellite service. For example, AMSAT has a long history of using its satellites to advance the state of the art in science and technology. The two areas that hold the most promise of providing a positive impact on society and Amateur Radio in the future are emergency communications and education. The limitations on our effectiveness in these areas are much the same as listed above.

The Technical Solutions

To address these and other perceived needs the AMSAT Board of Directors charted a new course at a meeting in early 2004 that calls for launching at least three high elliptical orbit satellites to provide satellite coverage at all times of the day. That will eliminate one of the impediments to wider use of the Amateur Satellite Service. The P3E and Eagle projects will provide the means to achieve that goal.

The Advanced Communication Payload (ACP) being designed for Eagle is intended to provide better link margins and higher quality communication while requiring smaller antennas that are easier to deploy and steer. These antennas may even be usable in apartments and communities with covenants because the antennas will probably look like today's TVRO antennas.

Recently another opportunity has presented itself that could be even more effective in helping AMSAT achieve its goals. Due to a dramatic change in the economics of building, launching and operating commercial geostationary satellites (life cycle costs), one major satellite service provider is making space available on their geostationary satellites for "rideshare" payloads. I have already met with them and AMSAT is in the process of preparing





a proposal for just such a payload that would consist of the Eagle transponders, at a minimum. This is a long shot, but if it happens we could place transponders at fixed points in the sky over each of the world's major regions and possibly even link them together. This would be the long sought after "Phase 4" payload AMSAT authors have written about for decades.

Education and Emergency Communications

A fleet of Phase 3 and/or Phase 4 satellites will give AMSAT new and unique capabilities to support both education and emergency communications in ways not available to the Amateur Radio community before. I single out these two areas because these are the primary benefits AMSAT can provide with the unique ability to add value to society as a whole and to Amateur Radio, specifically. I know this because in the process of working to raise money for the Eagle project these are the two areas that have been shown to get potential large donors, both individuals and foundations, excited and willing to donate the large sums of money that will be needed to obtain launches.

Beyond this, each of these areas deserves an entire column, and will get such treatment when there is more to say. For example, I have in mind the formation of an AMSAT Institute at the new AMSAT Lab and on the campus of the University of Maryland Eastern Shore. I will be meeting with officials of the Hawk Space Institute and the UMES in the near future to discuss this idea. I hope to develop a similar plan for emergency communications and discuss this with ARRL and others.

Summary

AMSAT is entering a new and exciting period in its history. To make all these plans successful we need the support of our membership, including your feedback, your donations and your participation in AMSAT activities.

2007 AMSAT Space Symposium and Annual Meeting

The 2007 AMSAT Space Symposium and Annual Meeting are coming up very soon. They will be held October 26-28, 2007 in Pittsburgh, Pennsylvania and will be preceded by an open AMSAT board

of directors meeting on the 25th and 26th. Hopefully if you plan to make a presentation at the Symposium you have already submitted your abstract and are working on your paper and presentation slides. If you wish to make a presentation to the board please let me know right away.

As I write this Emily, N1DID, has just finished the AMSAT Store registration pages and I have just finished adding the latest Symposium pages to the Web site. Please check out the Symposium pages on our Web site at www.amsat.org and make this the year you decide to come to AMSAT's great annual event.

AMSAT-UK Colloquium

Since my last column I traveled to England for the AMSAT-UK Colloquium. It was great to see many friends from Europe and to hear the latest on student projects and P3E progress. There was considerable discussion about the plans for the upcoming WARC meeting and plans to try to get improvements to the satellite band allocations added to the agenda for the next WARC. The satellite enthusiasts in Region 1 are making some very progressive proposals.

73,

Richard M. Hambly, W2GPS
AMSAT President



AMSAT is proud to offer the G6LVB Tracker Box

- Reasonably priced and all profits go to AMSAT
- USB or serial interface
- Ethernet interface capable
- Open software
- Open architecture
- Non-proprietary protocol
- Built in rotor interface cable with DIN connector
- Power supplied via the rotor controller cable
- Bi-directional interface allows the unit to read the rotor position
- LCD position readout
- Front panel manual control
- Self-programmable, allows for easy software upgrades
- Supported by the major tracking programs
- Uses GS-232A or Easycomm I/II protocols



Contact Martha at the AMSAT office 301-589-6062 to order. The complete units will be built in groups of 20, so get your orders in early.

- Bare board - \$20
- Populated board - \$100
- Custom box - \$50
- Complete operational unit (assembled board, LCD, DIN rotor cable, box) - \$200
+ shipping and handling for all the above units



Additional Real World Helix Antenna Comparison Measurements

by Clare Fowler, VE3NPC, ve3npc@amsat.org

Abstract

Field test range comparative gain measurements were made on a number of helix antennas of different sizes and with different types of reflectors. Test results indicated that the difference in gain for antennas with square flat reflectors varying from 0.84 wavelengths to 1.6 wavelengths did not change significantly. Antennas with a cup reflector however had between 0.8 db and 1.4 db more gain over those with a flat reflector.

Technique

My previous paper "Real World Helix Antenna Comparison Measurements"[1], did not deal with the possible effects of the reflector on the gain of a helical antenna. Comparison measurements were made using the test equipment and method used

comparison measurements. They were 2.88 wavelengths (13 turns) long, 5.76 wavelengths long (26 turns) and 11.53 wavelengths long (52 turns) respectively.

Seven new 12.5 cm band helix antennas with a circumference of 1 wavelength and a pitch angle of 12.5 degrees, following the Kraus design, were constructed as before with fiberglass booms and with the same quarter wave matching method [2].

Three of the new antennas were 2.88 wavelengths long (13 turns) but had different sizes of square aluminum reflectors. The three sizes of reflectors were: 0.56 wavelengths (7x7cm) per side, 1.0 wavelength (12.5x12.5cm) per side, and 1.4 wavelengths (17.5x17.5cm) per side.

Another new 11.53 wavelengths long (52

reflector was fabricated using a piece of PC board for the disk and thin brass plate for the lip. The brass plate was soldered together to form a cylinder, which was soldered to the PC board disk as pictured in Photo 1.

Gain comparison measurements were then made between the original antennas and the new ones with the differing size and type of reflectors.

Shown in Table 1 are the test measurement comparison results for the antennas with different sizes and type of reflectors. Except for the one with the 0.56 wavelength reflector the gain differences between those with flat reflectors of different sizes were less than 0.1 db. For the amateur satellite home constructor this is not significant. The gain difference between the 52-turn helix with a 0.84 wavelength square reflector and the 52-turn helix with a 1.6 wavelength square reflector was measured to be +0.1 db, which again is not significant. The -1.4 db less gain shown by antenna with the 0.56 wavelength indicates that a reflector this size is too small.

The test measurement comparison results between the helix antennas with a 0.84 wavelength square aluminum reflector and the helix antennas with a cup reflector however are very interesting. The increase in gain provided by the use of a cup reflector for the 13 and 26 turn antennas is 0.8 db while that of the longer 52-turn helix antenna is 1.4 db. This improvement in gain provided by the use of a cup is worth considering when constructing helix antennas for the 23 and 12.5 cm bands. The additional 1.4 db gain for the 52 turn antenna is notable and adds to the argument that useful gain can be achieved by increasing the number of turns up to at least 50. Employing a cup for 70 cm band helix antennas probably is not practical due to the added weight and increased wind loading.

The popular wisdom has been that the gain of a helix antenna levels off at about 25 turns and to achieve more gain it is necessary to construct an array of several antennas. My measurements have led me to the conclusion that a single 50 turn helix will provide gain equal to or better than an array of two 25 turn helix antennas. It is very doubtful that you will obtain the 3 db increase in gain by combining two 25 turn helix antennas due to the losses associated with the power combiner, the extra connectors and cables



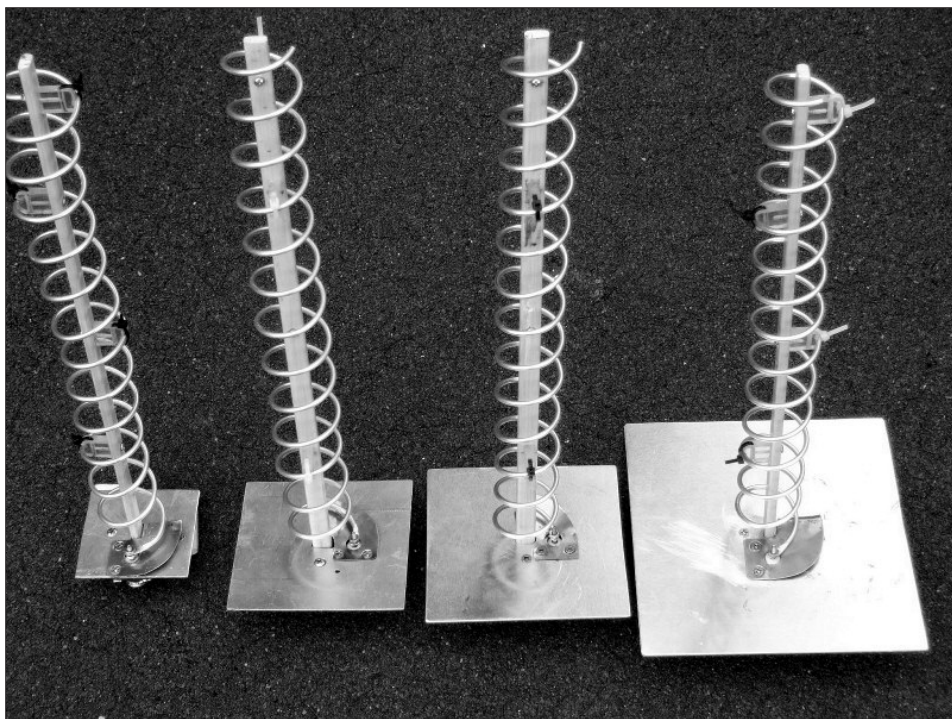
Helix antenna with a cup reflector with a diameter of one wavelength and a lip 1/4 wavelength high.

for the previous measurements. Briefly, this involved a 2401 MHz weak signal source feeding a 52 turn helix antenna transmitting at a distance into the antenna to be evaluated, which was directly connected to down converters connected to a step attenuator feeding into a 28 MHz RF voltmeter.

Three previously constructed 12.5 cm band helix antennas with 0.84 wavelengths (10.5x10.5cm) square aluminum reflectors were used as reference antennas for the

turns) helix antenna was constructed but with a 1.6 wavelength (20x20cm) square aluminum reflector.

Also constructed were three new helix antennas of different lengths with a cup reflector with a diameter of 1.0 wavelength (12.5cm) and with a 0.25 wavelength (3.125cm) high lip. One antenna was 2.88 wavelengths long (13 turns), one 5.76 wavelengths long (26 turns) and one 11.53 wavelengths long (52 turns). The cup



Four helix antennas 2.88 wavelengths long (13 turns) with square flat reflectors. Reflector size is left to right: 0.56 wavelength, 0.84 wavelength, 1.0 wavelength and 1.4 wavelengths.

and the difficulty in combining the two signals exactly in phase and overlap of the apertures. And there is much more work involved in constructing the array than the single antenna.

Appendix

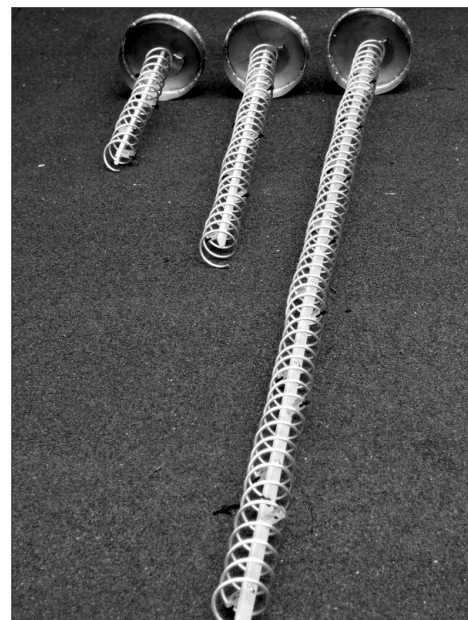
Making real world field test measurements on antennas is a relatively inexact science. At least for me, and I think for anyone who objectively and critically analyses their results. It is easy to make repeated measurements of the voltage of a battery to 0.1 volts with a digital voltmeter. It is very difficult to make repeated measurements on the difference in gain between two antennas within 0.5 db on different days in different environments. The measurement results shown in Table 1 are the means of from 1 to 4 comparison measurements made between the reference antenna and the test antenna made on each of four different days. All measurements were within +/- 0.5 db.

In an attempt to determine the source of the additional gain provided by the cup, polar plots of the 52-turn antennas were made. No significant differences could be measured from 0 to 60 degrees. Beyond 60 degrees, readings were below -20 db and could not be made with any degree of reliability. There was an indication though, that the numerous rear lobes of the cup antenna were somewhat lower than those of the antenna with the flat reflector.

As noted in my previous paper very little direct experimental evidence appears to exist to verify the many published computer modeling results for helix antennas and more independent work should be done as it appears there may be some discrepancies.

References

- [1] Clare Fowler, VE3NPC. "Real World Helix Antenna Comparison Measurements", *The AMSAT Journal*, May/June 2006.
- [2] Clare Fowler, VE3NPC, "The Development of a Quarter Wave Match for Helical Antennas", *The AMSAT Journal*, November/December 2005.



Three helix antennas with cup reflectors. Top to bottom: 11.5 wavelengths long (52 turns), 5.75 wavelengths long (26 turns), 2.84 wavelengths long (13 turns).

Antenna Length (Wavelengths/Turns)	Reflector Size (Wavelengths/Dimensions cm)	Gain/Loss (db)
2.88/13	0.56/7x7	-1.5
2.88/13	0.84/10.5x10.5	0 (reference)
2.88/13	1.0/12.5x12.5	0
2.88/13	1.4/17.5x17.5	0
11.5/52	0.84/10.5x10.5	0 (reference)
11.5/52	1.6/20x20	+0.1
2.88/13	0.84/10.5x10.5	0 (reference)
2.88/13	Cup 1.0/12.5x3.125	+0.8
5.76/26	0.84/10.5x10.5	0 (reference)
5.76/26	Cup 1.0/12.5x3.125	+0.8
11.5/52	0.84/10.5x10.5	0 (reference)
11.5/52	Cup 1.0/12.5x3.125	+1.4

Table 1: Gain or loss of a number of helical antennas with different sizes and types of reflectors relative to one with a 0.84 wavelength (10.5x10.5 cm) solid square reflector.

Blast Off

By Dee Interdonato, NB2F,
n2bf@amsat.org

If you remember when you were a younger ham the space shots that you watched on TV had the T minus 5, 4, 3, 2, 1 Blastoff scenario. We all did this with anything we “launched” or celebrated after that. I wanted to see a liftoff of the Space Shuttle for a long time and decided to see if I could get to watch the recent launch of STS-118 from the Cape. I found out that to be at the Cape for a launch, you need tickets. So, I promptly ordered some for my wife and I and made arrangements to travel to Florida during the time the Space Shuttle was to be launched. Though delayed by 24 hours, we went to Kennedy Space Center and were entertained after the delays by the thrill of the T minus 5, 4, 3, 2, 1 Blastoff!

There were 30,000 attendees suffering through the 98° temps at the launch at the Space Center and 70,000 off site watching from adjacent area roads. I listened on the local repeater that rebroadcast the NASA TV/radio chatter. This was a hit for the people around me. I took video and my YL took some pictures as the event unfolded. It was exciting to say the least. In 5 minutes it was history but I had attended a Space Shuttle launch. No video or recording can give you the presence of being on site. Many visitors from all over the world were on hand to witness this event and U.S. technology overwhelmed us all. The only more exciting thing would have been an HEO OSCAR being onboard.



Three years of Shuttle launches are left, as the Shuttle will be replaced by a newer space vehicle-the Orion. If you plan to be in the area during a launch (you can see a list of launch dates & attending information on the KSC website), make time to view this spectacular event. 📡



NB2F in the heat!



2007 AMSAT Space Symposium Update

by Barry Baines, WD4ASW, wd4asw@amsat.org

As this issue of *The AMSAT Journal* is going to press, here is some last minute additional information about Symposium.

1. The AMSAT Symposium Web page may be used to register for the Symposium as well as register for a room at the Pittsburgh Airport Marriott where the Symposium will be held. The AMSAT hotel rate is \$104.00/night. The AMSAT group code (RMSRMSA) must be used to secure this rate. Alternatively, attendees may call the hotel direct (412) 788-8800 or call the national reservation center at 1 (770) 739-9461, again referring to the special group code to secure the special AMSAT room rate.

The deadline for reserving your room at the special AMSAT rate is October 8, 2007. In addition, once the AMSAT block of rooms is taken, the room rate of \$104.00/night cannot be guaranteed.

The 2007 AMSAT Symposium Web page is:

<http://www.amsat.org/amsat-new/symposium/2007/index.php>

2. AMSAT Symposium pre-registration may be done via the AMSAT Web site or via phone or mail. The pre-registration rate of \$55.00 is good through September 15. Between September 15 and October 20, the registration fee is \$60.00. After October 20, registration will only take place at the Symposium where the cost is \$65.00.

Do NOT procrastinate. Register for Symposium and make your hotel reservation NOW to benefit from these lower rates.

3. New this year is the opportunity to purchase a Symposium golf shirt. Our host for this year's Symposium, The Wireless Association of South Hills Amateur Radio Club, has created two designs highlighting our gathering in Pittsburgh. One design features a maroon shirt that may be ordered prior to Symposium and worn at Pittsburgh. The second design, featuring a black and gold shirt (Pittsburgh Steelers colors) will be worn by the Symposium staff during Symposium. Attendees may order this design to be delivered following Symposium. Check the

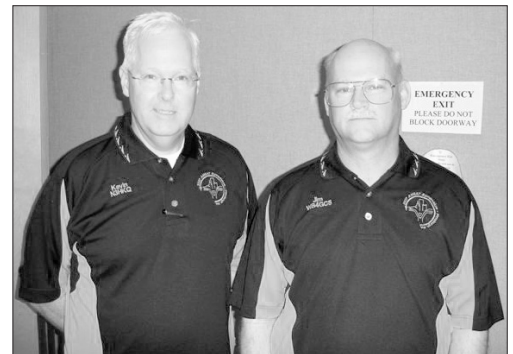
AMSAT Web site for more information or else order your shirt at Symposium for delivery later.

4. Authors are still in the process of submitting their papers for this year's Proceedings. The presentations at Symposium are based upon what papers are provided, so we don't yet have a presentation schedule developed for Friday and Saturday. However, we expect presentation subjects to include Eagle Development, SuitSat-2, ARISS, Education, Solid State Power Amplification, the AO-51 Power System, Lindenblad Antenna for 70cm and AMSAT's new Integration Facility at Pocomoke, MD.
5. The IARU Satellite Forum will take place at 1000 on Sunday morning. It will be led by Hans van de Groenendaal, ZS6AKV, IARU Amateur Satellite Advisor. This forum alternates between the AMSAT-UK Colloquium and the AMSAT-NA Symposium with it being held this year in the US.
6. Richard Crow, N2SPI, will conduct a workshop that will have student amateurs build simple 2m and 70cm satellite antennas and use them to receive signals from AO-51, SO-50 or AO-27. This will be a two-phase workshop, with one session on Friday and the second session on Saturday morning culminating with working a satellite pass.
7. The Annual Field Ops Breakfast, led by Gould Smith, WA4SXM, will start at 0800 on Sunday morning. All Area Coordinators and anyone else interested in representing AMSAT in their community are invited to attend. Breakfast may be ordered for \$15.00 as part of the Symposium registration, but attendees are not required to order breakfast to participate in the meeting.
8. The Sunday tour is of the new WPXI-DT studios that are still under construction at press time. Contractors are racing to have the station on the air by mid-October but this may slip to mid-November. In any event, the tour will take place and Symposium attendees will be able to see a state-of-the-art television station either nearly finished

or operating. Symposium sponsors are told that it may be better to see a nearly completed rather than a completed station because we may be able to "play". It's not known exactly what that means but it should be interesting. Stay tuned for more information. The tour bus will depart the hotel at 1100 with the cost being \$15.00 per person. A boxed lunch may be ordered for \$6.00. Both the tour and lunch are options included in the AMSAT Symposium registration Web page.

Questions or comments about Symposium should be directed to the Symposium committee at symposium@amsat.org. Kevin Smith, N3HKQ, and Pat Sanford, KC4WTT, are the Co-Chairs for the 2007 AMSAT Symposium and are leading a team of volunteers who are working hard to make this year's Symposium a success. Come enjoy Pittsburgh's hospitality, learn about what is happening with AMSAT's projects (P3-E, Eagle and SuitSat-2), meet with fellow satellite operators, and talk with the AMSAT senior leadership team.

See you in Pittsburgh! ☺



The 2007 Symposium Shirt in Black and Gold will be worn by Symposium Staff during Symposium, but may be ordered for delivery following Symposium.

More Symposium information is on the following page ...



Where can I get more information?

For general club information about the 2007 AMSAT Space symposium, visit our web site at <http://www.amsat.org>

Or contact:

Kevin Smith **N3HKQ**
or
Pat Sanford **KC4WTT**
at
symposium@amsat.org

Support Eagle Today!



2007 AMSAT Space Symposium

October 26—28, 2007
Airport Marriott Hotel
777 Aten Road
(Moon Run exit of PA 60)
Coraopolis, PA 15108



- Meet a number of key engineers and spacecraft designers who have put amateur radio in space.
- Are you new to amateur satellites? Learn how to make and participate in satellite contacts.
- Learn about the latest Eagle innovations.
- See how you can contribute your talents to the Amateur Satellite Service.



Additional Symposium Info

Annual International Amateur Radio Satellite Forum

The IARU Administrative Council has decided to continue holding the forum alternating between the USA and the UK. We are back on schedule after last year. This year it will be the US's turn. There will be 3 speakers, but most of it will be a panel discussion with the delegates asking questions, making comments, etc. The forum will take 1 to 1.5 hours and is open to everyone attending the Symposium. The widest possible participation is encouraged.

Antenna Workshop

Second, Richard Crow, N2SPI, will conduct a workshop that will have student amateurs build simple 2m and 70cm satellite antennas and use them to receive signals from AO-51, SO-50 or AO-27.

Who Is AMSAT?

AMSAT is a non-profit volunteer organization which designs, builds and operates experimental satellites and promotes space education. We work in partnership with government, industry, educational institutions and fellow amateur radio societies. We encourage technical and scientific innovation, and promote the training and development of skilled satellite and ground system designers and operators.

Our Vision is to deploy high earth orbit satellite systems that offer daily coverage by 2009 and continuous coverage by 2012. AMSAT will continue active participation in human space missions and support a stream of LEO satellites developed in cooperation with the educational community and other amateur satellite groups.

Who Are Your Hosts?

- The Wireless Association of South Hills Amateur Radio Club is a non-profit organization, affiliated with the American Radio Relay League (ARRL) and dedicated to advancing the principles of amateur radio while making it fun for all who participate.
- We also have the active support of many local amateur radio clubs and AMSAT members.
- WASH co-sponsored an ARIS contact for Upper St. Clair HS in August 2004.
- Routinely make satellite contacts for Field Day.
- Visit us at <http://www.n3sh.org>



Why Pittsburgh?

- A friendlier place you will never find
- An easy 5-hour automobile commute for half of the US population.
- World class International Airport.
- Served by most major Airlines including American, Continental, United, Southwest, USAirways/Southwest, Delta, Air Canada and economy airlines including Jet Blue, ATA, Air Tran Airways, Midwest, Comair, etc.



Preliminary Agenda:

Thursday, October 25 through Friday noon, October 26, 2007 BOD meeting
Friday, October 26, 2007
Symposium First Session: 1:00 to 5:00 PM
Annual meeting: 5:00 to 6:00 PM
Introduction to Amateur Satellites by Gould Smith; 7:30 - 9:00 PM
Saturday, October 27, 2007
Symposium Second Session: 8:00 AM to 12:00 Noon
Symposium Third Session: 1:30 PM to 5:00 PM
Cocktails & Hors D'oeuvres: 6:30 PM to 7:30 PM
Banquet (Keynote Speaker Mr. Sy Liebergot); 7:30 PM till ?
Sunday, October 28, 2007
Area Coordinators meeting: 8:00 AM - 9:00 AM
Tour (details to be announced); 9:00 AM to ?

About Our Keynote Speaker Sy Liebergot Apollo Electrical, Environmental, Consumables Flight Controller

Sy Liebergot: Flight. I recommend we shut down reactant valves to the fuel cells.
Gene Kranz: What the hell good is that gonna do?
Sy Liebergot: If that's where the leak is, we can isolate it. We can save what's left in the tanks and we can run on the good cell.
Gene Kranz: You close 'em, you can't open 'em again! You can't land on the moon with one healthy fuel cell!
Sy Liebergot: Gene, the Odyssey is "dying". From my chair here, this is the last option.

Sy Liebergot was the Apollo EECOM and part of the team that guided Apollo 13 back to Earth following the explosion which crippled the spacecraft.

Author of "Apollo EECOM: Journey Of A Lifetime"

Web site: <http://www.apolloeeocom.com/>

The LVB Tracker Box

Gould Smith, WA4SXM, wa4sxm@amsat.org

Due to the popularity of the G6LVB Tracker Boards at Dayton this year, AMSAT is announcing a new addition to its growing list of offerings: the LVB Tracker Box.

Now is the time to replace your aging rotor controller and its no longer supported interface with one that easily connects with

The box offers many useful features in addition to the interface. The ability to read the current rotor position and stop the rotor if it is not turning is especially important to me. The LCD display will show you where your antennas are pointed in 1° increments, rather than the 15° marks on the rotor display. There are also four pushbuttons on the front

this to connect serially to the Tracker Box. Although these aren't the fastest, or state of art communication interfaces, they should be around a while. There is even the ability to use an Ethernet interface to the LVB Tracker Box.

This box will work with most of the major software tracking programs, those which support the Yaesu GS-232A or Easycomm I/II protocols. Essentially what you do is select one of these two rotor communication protocols in the tracking program and it should provide you an interface. SatPC32 will automatically start the ServerSDX program when it starts. This program acts as the interface between the tracking software rotor position data and the Tracker Box USB/serial port.

The LVB Tracker Box has a built in cable with a DIN plug that plugs directly into a Yaesu 5400/5500 rotor controller box. No need to build or buy another rotor interface cable. The unit is powered by the Yaesu control box, so no external power cable or connection is required. Simply unpack the complete unit, plug it into the Yaesu control box, add a standard USB cable to your computer, install the standard FTDI drivers, set up the tracking software rotor control settings and you are good to go.

Another great feature of the Tracker Box is that the USB port interface is supported by most of the popular operating systems like Winows98, ME, 2000, XP, Vista, Mac OS-8, OS-9, OS-X, Linux, Open BSD and Free BSD.

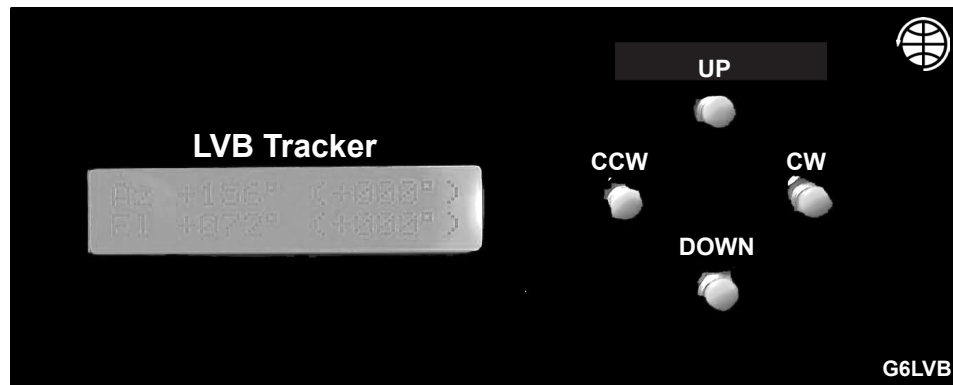
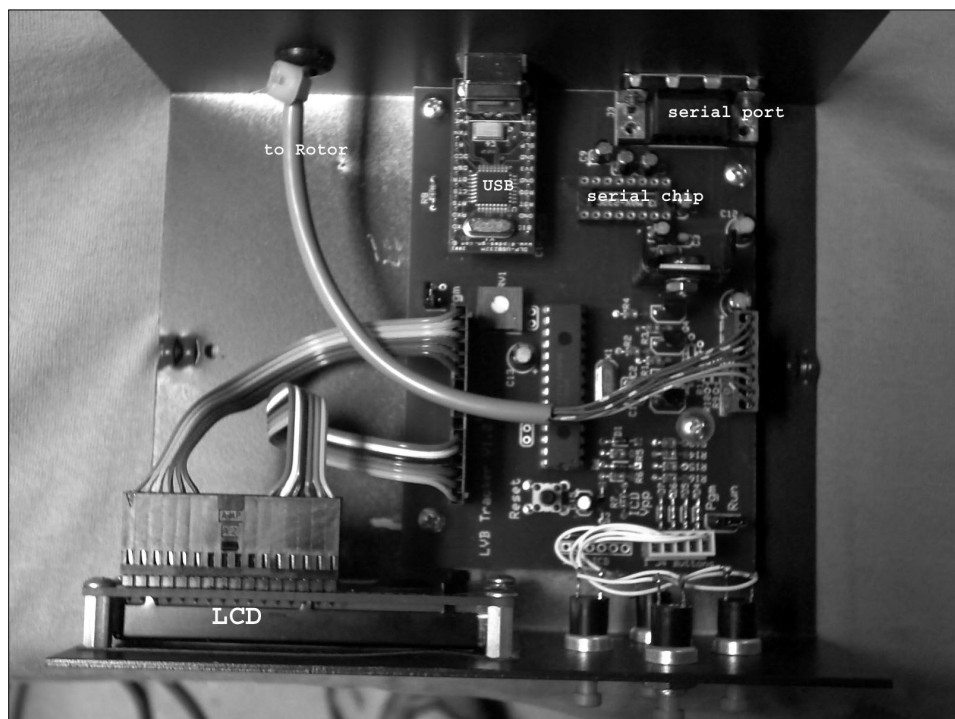
Howard also built into the board a self-programming interface. His open software can be modified and enhanced and then simply burned into the chip directly using the serial interface. As improvements are made, all users can easily upgrade at home. No need

new computers and laptops. No need to try and maintain that ancient computer with an ISA bus, one serial port or parallel port. The Tracker Box communicates with your computer via a USB or serial port. It will accept commands from the major tracking programs like SatPC32, NOVA, WiSP and MacDoppler using the GS-232A or Easycomm I/II protocols. The Tracker Box will take this data and control the Yaesu 5400/5500 series AZ/EL rotors.

Howard Long, G6LVB, who graciously donated the PCBs to AMSAT at Dayton, has allowed us to reproduce his boards. Mike Young, WB8CXO, who built the tracker and rotor display at Dayton, has generously donated many hours over the last few months in putting together a unit that we can reproduce at a reasonable cost. We will be offering the LVB Tracker Box in a custom made Ten-Tec box with silk screening. Mike will be building and assembling the units.

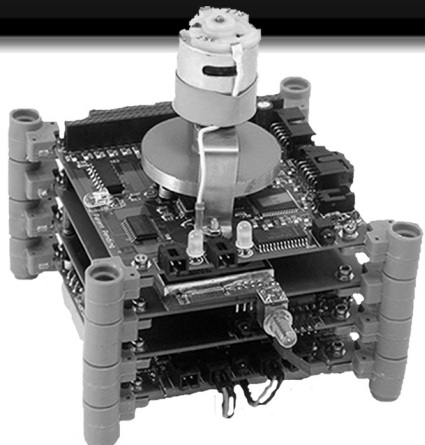
panel that allow you to manually control the rotor in a logical manner.

You can select to use either a USB connection or a serial connection to your computer. The complete unit will ship with the USB module installed, those wishing to use the serial port will need to take out the USB module and insert the serial converter chip. It is also possible to connect a PCI bus to serial board in your computer and use





The Classroom Satellite



Used by NASA, the U.S. Air Force Academy, and institutions around the world to give students and working professionals hands-on experience with satellites.

"I've been controlling satellites with reaction wheels for 20 years - now I really understand how they work!" - NASA Engineer

Find out more at <http://www.EyasSat.com> !

for an expensive external programmer.

Tracker 2

The Tracker 2 is a new enhancement to the LVB Tracker that will work with the current board and most of the hardware. The schematic and documentation are on Howard's site: <http://www.g6lvb.com>. This device can be used as a portable, battery powered unit for satellite tracking. Howard has added the ability to compute and display upcoming satellite passes as well as rotor control. Automatic tracking of satellites selected from a menu on the LCD. A few parts, a new microcontroller, two new DB-9 connectors and software that is on board programmable are all that is needed to upgrade to the Tracker 2. Two line Keys are uploaded via the serial/USB port and there are also Morse code AOS alerts. We have provided space in the box to add these hardware upgrades. The new microcontroller chip fits in the same socket and since they are both Microchip PIC processors, they have compatible pin outs.

I imagine you are now saying, "Well and good, but when can I get one?"

Availability

We expect to have some units by the 2007 Symposium and more to follow in a timely

manner. In early August we have developed a box and layout we are happy with, identified the parts and suppliers we can order from, have the board layout done and are talking with the enclosure maker. So we expect to begin assembly in September, but you know how that goes. Worst case, we will have a working demo unit at the Symposium and the first group should have their units within a few weeks.

We are offering the LVB Tracker a number of ways:

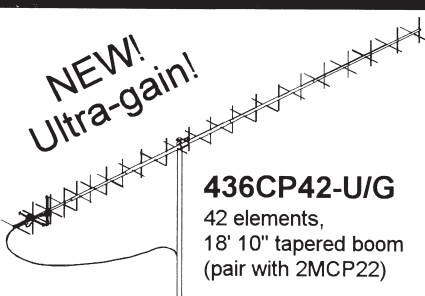
- 1) Bare board
- 2) Populated board
- 3) Case only
- 4) Complete operational unit.

Contact Martha at the AMSAT office to order what best fits your needs. See the ad on page 4 in this issue for prices. Shipping and handling are extra.

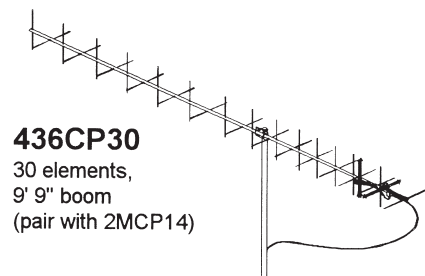
Enjoy this new product. Many thanks to Howard, G6LVB, and Mike, WB8CXO, and Dick Jansson, KD1K, for their hard work to make this box a reality. ☺

M² YOUR SATELLITE ANTENNA SOURCE

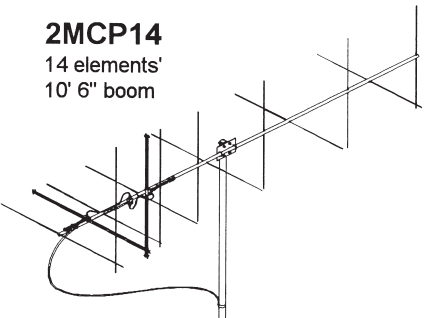
NEW! Ultra-gain!



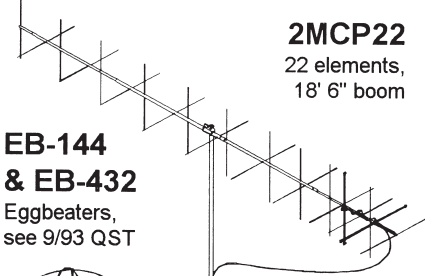
436CP42-U/G
42 elements,
18' 10" tapered boom
(pair with 2MCP22)



436CP30
30 elements,
9' 9" boom
(pair with 2MCP14)

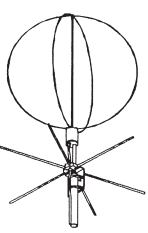


2MCP14
14 elements'
10' 6" boom



2MCP22
22 elements,
18' 6" boom

EB-144 & EB-432
Eggbeaters,
see 9/93 QST



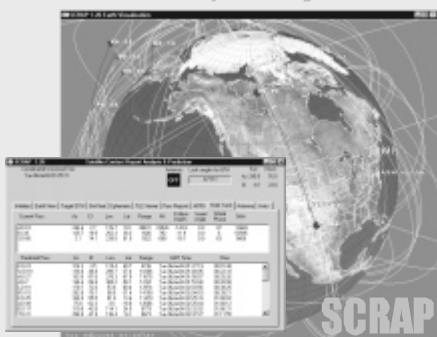
- Stacking frames
- AZ & EL positioners
- Fiberglass crossbooms
- Power Dividers
- Phasing harnesses

M² 4402 N. Selland
Fresno, CA 93722
(559) 432-8873 FAX: 432-3059



Satellite Contact Report Analysis Prediction



Performance Features

1. Contact Prediction / Reports
2. SGP/SDP ephemeris prediction
3. Real-time 3-D visualization
4. Over 25 Earth texture overlays
5. APRS station display
6. Multiple ground station support
7. Antenna rotor Az/EI control
8. Internet updates for TLE data
9. Astronomical data (Planets, moon)
10. Simulation

Order your copy now

Price is \$50 for AMSAT members, \$60 for non-members, postpaid on CD-ROM. Order by calling 1-888-322-6728, or use the online shop at <http://www.amsat.org>

SCRAP is a product of the
Bythovay Software Development Lab (BSDL)
More info at <http://www.nty.combythovay>

AMSAT is the North American distributor of **SatPC32**, a tracking program designed for ham satellite applications. For Windows 95, 98, NT, ME, 2000, XP.

Version 12.4 now supports Labjack U12 and W0LMD rotor controllers and Doppler tuning for Yaesu FT-817/857/897.

Features:

- Version 12.4 also supports automatic Internet download of Keplerian elements.
- Graphical tracking on a world map with two selectable Zoom factors.
- One-click satellite switching using 12 "letter" buttons.
- Automatic rotor control support for: Kansas City Tracker/Tuner, FODtrack, Uni_Trac, SatEL, Labjack U12/Piggyback, W0LMD Mini/Junior/Senior Trackers, Yaesu GS-232, ARS from EA4TX, EGIS rotors, IF-100, RIF-PC, AMSAT-DL interface, WinRotor32, HalloRotor, and WiSP DDE clients.
- Doppler tuning with on-screen frequency displays. Radio models supported: Yaesu FT-847, FT-736R, FT-817, FT-857, FT-897, ICOM IC-820H, IC-821H, IC-910H and other ICOM radios, Kenwood TS-790 and TS-2000 DDE client programs
- "Transparent" VFO-knob tuning in addition to keyboard and mouse tuning.
- "Virtual" VFO tracking for half-duplex transceivers FT-817, FT-857, FT-897.
- Includes a special version for ISS split-frequency operation.
- Controls subaudible tone on FT-847, FT-736R, FT-817/857/897, and IC-910H.
- Includes a non-graphical version and programs that output lists to the screen, printer, or a file.
- Interfaces with WiSP, with user-defined satellite switching priority.
- Includes a separate program for tracking the Sun and Moon.

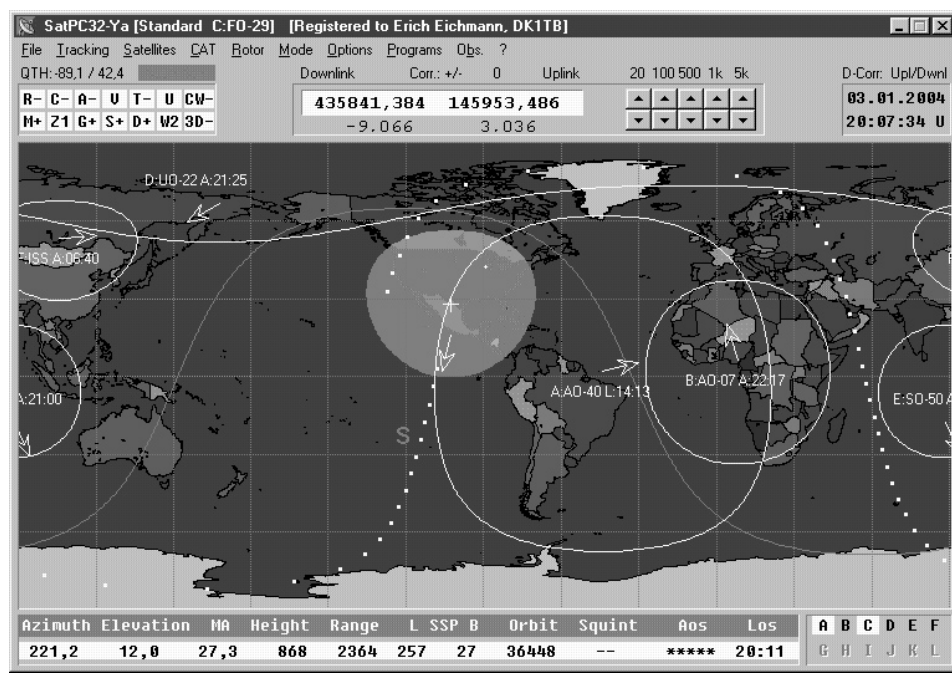
Price is \$45 for AMSAT members, \$50 for non-members, on CD-ROM.

A demo version may be downloaded from <http://www.dk1tb.de/indexeng.htm>

A registration password for the demo version is \$40 (members), \$45 (non-members).

Order by calling 1-888-322-6728, or use the online shop at www.amsat.org.

The author DK1TB donated SatPC32 to AMSAT. All proceeds support AMSAT.



The Orbital Classroom

Column #9

"Morse Code Redux"

© 2007 by Prof. H. Paul Shuch, N6TX, n6tx@amsat.org

AMSAT Director of Education



The Orbital Classroom

Our last column, dealing with the elimination of the Morse Code requirement from Amateur Radio licensing examinations, generated numerous interesting responses from AMSAT members. I thank all of you who shared your thoughts with me. Among the most thought provoking were these comments from Nickolaus E. Leggett, N3NL:

"My own opinion is that Morse code will go on to make its way based on its 'free market' appeal. For many people, myself included, CW has great aesthetic appeal much like sailing, glider flying, balloon flying or shooting traditional target archery. These obsolete modes have an appeal because they depend strongly on the skill of the operator.

"Morse code provides several important benefits to the modern Amateur Radio service. These benefits include (but are not limited to) the following:

1. Simple low-power communication systems that can communicate around the world on the high frequency (HF) Amateur Radio bands.
2. Inexpensive equipment that can be owned by Amateur Radio operators of modest means in the United States and abroad
3. A communications mode that functions well between people who speak different languages (using the Q signals).
4. A communications mode that is easily supported by home-made and kit-built radio equipment. This feature is very useful for new Amateur Radio operators learning electronics technology.
5. Morse code transmitters and receivers are easy to repair in the field.
6. In an extreme emergency, amateurs can provide Morse code communications using improvised equipment.
7. Educators, such as Mr. J. Fairclough of the Radio Club of Junior High School 22 in New York, have pointed out that Morse code is a significant motivational factor in using Amateur Radio in an educational environment.

"On the more important question of Amateur Radio as a supportive environment for technological learning, experimentation and invention," continues Nick Leggett, "AMSAT has done very well indeed. However, I am not as convinced that Amateur Radio as a whole is doing well as a technology stimulator. When, I started in ham radio in the 1960s, ham radio was very technological. Now, many hams are users of technology rather than students and creators of technology.

Nick concludes, "I suspect that Amateur Radio will have to do more to be an incubator of technological skills to retain its frequency allocations over time. A first step on this should be to open hands-on learning opportunities to all hams, not just to those in university programs."

Clearly, Nick Leggett's vision of hands-on learning mirrors AMSAT's educational mission. One challenge now facing the AMSAT leadership is how we might incorporate satellite communications into such an expanded academic environment, while continuing to develop our essential on-orbit assets. Whether we communicate by Morse, or voice or computer keyboard, we who promote global amateur satellite communications are in a position to inspire future generations along the road to lifelong learning. As an AMSAT member, you can help – all the while benefiting yourself. Remember, there's no truer path to knowledge than through teaching.

Subject: Morse and Ham radio
 Date: Thu, 19 Jul 2007 10:17:54 -0400
 From: Kai Siwiak <k.siwia@ieee.org>
 To: n6tx@amsat.org
 cc: wa4swj@amsat.org
 Re: "The Orbital Classroom, Column #8"

Thanks for a great column touching on my favorite mode: CW. What we know and use as the International Morse Code today bears no resemblance to what Samuel F.B. Morse demonstrated in 1844. Morse's code was designed to be decoded mechanically, but its successors evolved into a code that operators preferred to copy by ear – and did so with greater efficiency than could

be managed by automated devices of the time. In fact, International Morse Code sent by hand and copied by ear is still more efficient than modern text messaging as was demonstrated several times around the world, and most recently and very visibly by the Morse code team on NBC's Tonight show with Jay Leno.

It is precisely the "efficacy of the input and out put device" in the telegrapher versus text messaging aficionado that should clue us in on why Morse code will have a long and distinguished life in the future.

I am hardly a defender of any code requirement for Amateur Radio licensing. In fact I supported and applauded the removal of code as a needless barrier to licensing. The future of our hobby depends on a large influx of youngsters. We need those text "messengers" in our ranks to grow our hobby. But, Morse is hardly "irrelevant" in today's communications arena, and its popularity remains strong on the ham bands. The ITU has abandoned the code testing requirement but not the Morse code itself. In fact as recently as May 24, 2004, the 160th anniversary of the first telegraphic transmission, the ITU added the "@" ("commercial at" or "commat") to the Morse Character set ("di-dah-dah-di-dah-dit") to facilitate the sending of electronic mail messages [ITU-R Recommendation M.1677]. Notably, this was the first official addition to the Morse set of characters since the First World War.

The International Morse Code exhibits characteristics that today are associated with Huffman codes. It is a variable length code with the shortest-length characters generally appearing the most often in normal language test messages. That too slanted the thumbs versus keyer contest in favor of the keyer.

Morse code today remains the only digital communications form that can be sent and received without the use of a computer or some other sort of digital decoding hardware. It will remain popular because even when sent by hand and copied by ear it performs around 16 dB better in a given link than, say, SSB voice. Digital processing, forward error correcting codes and such can dramatically improve on Morse versus voice, but will



2006 Space Symposium and AMSAT Annual Meeting

Held October 6-8, 2006 in San Francisco, CA

Contents include articles on Echo, Eagle, ARISS, Ground Station User Equipment, University Satellites and much more! For example:

- Software Radios: An Enabling Technology for Satellite, Space and Ultra-Weak Signal Applications
by Courtney B. Duncan, N5BF/6
- Analysis of Maximum Elevation Pass Profiles for the AO-51 Satellite
by Gould Smith, WA4SXM
- Design of Eagle Modules
by Dick Jansson, WD4FAB
- ARISS - Ten Years as a Team and Six Years in Space
by The ARISS Team
- An EZ Lindenblad Antenna for 2 meters
by Anthony Monteiro, AA2TX
- Amateur Radio and the Cubesat Community
by Brian Klofas, KF6ZEO

To Order: **Proceedings - 2006**
(8½" x 11", 284 pages)

Minimum donation

Write, telephone or FAX:

AMSAT-NA

850 Sligo Ave. #600
Silver Spring, MD 20910, USA

Tel: 301-589-6062

Fax: 301-608-3410

\$20 in the U.S. + postage.
For rate to your mailing address see:
www.amsat.org and click on "AMSAT Store".
VISA, MasterCard or Discover charges are accepted.

not improve on "sent by hand and copied by ear".

The elimination of Morse as a barrier to entry into Amateur Radio will not in itself swell the ranks of either the world's ham population or AMSAT's membership. Morse code will live on because it offers something tangible to the hobby: access to larger-than-voice link margins using the simplest and most basic transmitters and receivers of ham radio. Ham radio and AMSAT, however, will live on only if we actively entice those "thumb texters" rather than show up the limitations of Short Messaging Service (SMS) devices.

Are CW enthusiasts on the decline? My informal observations, largely on HF and 6 m bands, are that if anything the Morse band occupancy seems to be on the rise. As for text messaging, a popular Short Message Service alert is "SMS" in Morse. For sending text, I'm "all thumbs", a hopeless case ... if only those messaging devices had a touch-paddle CW input.

73,

Kai Siwiak, KE4PT

AMSAT Life Member 



Please support AMSAT-NA.
Thanks!



AMSAT[®] President's Club! Join Now!

Contribute to **AMSAT[®]** directly through easy, automatic charges to your credit card.
Donations may be USA tax deductible. (Check with your tax advisor.)

Titanium Donors contribute at least US \$400 per month.

Every **Titanium Donor** receives gifts of:

☐ \$400 / month

- ✓ Everything at the Platinum Donor Level, PLUS:
- ✓ A very special, *hand crafted*, AMSAT President's Club Donor's pin.

☐ \$4800 one time

Platinum Donors contribute at least US \$200 per month.

Every **Platinum Donor** receives gifts of:

☐ \$200 / month

- ✓ Everything at the Gold Donor Level, PLUS:
- ✓ A very special, *hand crafted*, AMSAT President's Club Donor's pin.

☐ \$2400 one time

Gold Donors contribute at least US \$100 per month.

Every **Gold Donor** receives gifts of:

☐ \$100 / month

- ✓ Everything at the Silver Donor Level, PLUS:
- ✓ A personal invitation to the AMSAT Dayton dinner (free).

☐ \$1200 one time

Silver Donors contribute at least US \$50 per month.

Every **Silver Donor** receives gifts of:

☐ \$50 / month

- ✓ Everything at the Bronze Donor Level, PLUS:
- ✓ A personal invitation to a reception with the AMSAT Directors, Officers and project designers and builders (free).
- ✓ Annual endorsement sticker after each year of donation.

☐ \$600 one time

Bronze Donors contribute at least US \$25 per month.

Every **Bronze Donor** receives gifts of:

☐ \$25 / month

- ✓ A unique "AMSAT President's Club" certificate.
- ✓ A specially designed AMSAT President's Club Donor pin.

☐ \$300 one time

Core Donors contribute at least US \$10 per month.

Every **Core Donor** receives gifts of:

☐ \$10 / month

- ✓ A specially designed AMSAT President's Club Donor pin.

☐ \$120 one time

Choose where your contribution should go:

☐ AO-Echo ☐ AO-Eagle ☐ ARISS ☐ Future Projects ☐ General Fund

☐ RENEW my
President's Club
AUTOMATICALLY
every year!

☐ I prefer to make my donation in one yearly payment of \$ ____.

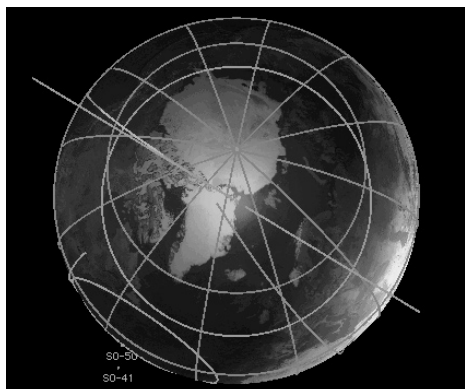
(Credit card only, please.)

THANK YOU!



MacDoppler

The premier Satellite tracking and station automation application for the Macintosh



MacDoppler for Cocoa gives you a seat right in the heart of the Operations & Command Centre for every satellite in orbit, providing any level of station automation you need from assisted Doppler Tuning and Antenna Pointing right on up to a fully automated Satellite Gateway.

It will calculate the position and relative velocity of the satellites you are tracking and automatically adjust the Doppler shift on both transmit and receive as well as pointing your antennas with predictive dead spot crossing so that a pass is never interrupted.

A Universal Binary that runs native on Intel and PPC Macs and provides separate panels for the map (2D or 3D), the radio and rotor controls, a sorted table of upcoming satellite passes and a Horizon panel that graphs upcoming passes as a function of elevation over time.

Now available at a special member discount price from AMSAT !

martha@amsat.org
850 Sligo Ave.
Silver Spring MD
20910-4703 USA.
(301) 589-6062, (301) 608-3410 (Fax)

Dog Park Software Ltd.
www.dogparksoftware.com

Do you still use manual tuning to remove Doppler changes? Why not automate?

Uni-Trac 2000 will automatically tune your Receiver (and Transmitter) to compensate Doppler frequency changes. Uni-Trac will also STEER your Antenna !

Uni-Trac 2000, including Interface Cable \$280.00
FOB Concord, Mass. 01742, USA.



Spectrum International, Inc.,
P.O. Box 1084,
Concord, Mass. 01742, USA.
Tel: (978) 263-2145
Fax: (978) 263-7008

SSB ELECTRONIC USA

PHASE 3D Equipment Headquarters

SSB Electronic USA features world class VHF - UHF - SHF equipment. The latest gear from: SSB Electronic, Kuhne Electronic - DB6NT, M2 Antennas, Beko Electronic, EME, Procomm, AIRCOM PLUS, AIRLINK, ECOFLEX and WINRADIO is available.

- Mast Mounted Preamplifiers 144 - 2400 MHz.
- Ultra Low Noise LNA's 50.0 MHz. 24.0 GHz.
- Transverters 50 MHz. - 24.0 GHz.
- Antennas - Rotors
- Downconverters and TX Upconverters for all P3D frequencies
- Mode "S" Downconverters
- Mode "L" TX Upconverters
- Linear Amplifiers 50 MHz. - 24.0 GHz.
- Ultra Low Loss Coaxial Cable
- Transverter Kits 1.2, 2.4, 5.7 & 10 GHz.
- Parabolic Dishes

So What's New ?

BEKO Electronic: 144 MHz. - 1296 MHz. Linear Amplifiers 100 Watts - 1200 Watts

DB6NT Electronic: MKU 24 OSCAR Mode "S" Downconverter IF 144 or 432 MHz.
MKU 10 OSCAR 10.451 GHz. Down Converter
MKU 24 G2 OSCAR 2.4 GHz. Transverter 1 Watt
MKU 57 OTX 5.6 GHz. OSCAR TX Upconverter *plus more.....*

ECOFLEX - LLC Super Flexible Low Loss Coaxial Cable

SSB Electronic: UEK-3000SAT Mode "S" Downconverter IF 144 or 432 MHz.
UTM-1200 DLX Mast mounted 1269 MHz. 15 Watt TX Upconverter
UTM-1200-1 1269 MHz. 1 Watt TX Upconverter
SP-2000 & SP-7000 Heli-Filtered Mast-Mounted Preamps *plus more.....*



SSB
Electronic USA

For complete specifications and prices, please visit our WEB SITE: www.ssbusa.com

Phone 570-868-5643

New Hours: MTWTFSS
9:00 AM - 11:00 PM

124 Cherrywood Dr.
Mountaintop, PA 18707



AMSAT EAGLE Update

James A. Sanford, PE, WB4GCS, wb4gcs@amsat.org

Eagle Project Manager

Our Vision is to deploy high earth orbit satellite systems that offer daily coverage by 2009 and continuous coverage by 2012...



Folks, this is a short update. I'm being consumed more than I'd like in family events and in Symposium preparations. More information will be in future *Journal* articles.

I am really excited about the Symposium and hope to see you there. If you've never been to one and are in range of Pittsburgh, please consider coming. I'll be there throughout the technical sessions and in the hospitality room. I'd love to meet all of you and to answer your questions. I've spent a lot of time in the last six weeks assessing the proposed papers, and reviewing the Eagle submissions. There is some REALLY GOOD information coming your way at Symposium.

Eagle Progress

Juan Rivera & team continue work on the U-Rx. We still have issues with passband ripple and with EMI from the CAN-Do! switching power supply. Juan will present an excellent paper at Symposium covering all we've

learned about techniques and processes.

The CAN-Do! Team has agreed to make changes to the power supply but we are seeking an experienced power supply designer to help. To an experienced switched-mode power supply designer this issue is not complicated. Several of us could mess with it but the effort is better spent elsewhere. I would REALLY LIKE to recruit some new talent to work this issue. We need to go from the spacecraft bus, 10 – 14 volts to 5 volts for embedded loads at currents ranging from tens of milliamps to half an amp. We need to do this efficiently and with minimal EMI. The manufacturers tell us how to do this, we merely need someone to step up to the plate and lead the design effort. If you think you can do this please contact me. In the meantime, Juan will take it on. Juan is more than capable but there are other things I'd like Juan's team to be doing, which is why I'm seeking another expert. If you are that expert,

please contact me.

Bob Davis reports continuing progress on the Lab in MD. He will present two papers at Symposium, one on the spacecraft structure and one on the lab itself. We are poised for good things to occur there!

Our Symposium hosts are bringing a 30-foot tilt-over crank-up tower on a trailer with 2m and 70cm antennas. We'll be able to work satellites and, more importantly, demonstrate the U-Rx, a V-Tx, and an SDX as a 70cm to 2m transponder in the local area. Come to Symposium, and let us show you what we've been working on.

See you in Pittsburgh!

As always, questions and comments to, wb4gcs@amsat.org

73,

Jim ☺

Here are some photos of a just-held Symposium planning meeting in Jim's dining room. The group is working hard planning for the Symposium. Why don't you plan to attend in Pittsburgh this fall?

Paul; Larry; Dave, N3IDH; Dan; Jim, WB4GCS; George-Anne; Molly, KA9 <grin>; and Pat, KC4WTT, Co-Chair of the event.



Ed, N3ZNI; Mary Lou, KB3FNM XYL; Paul, N0VLR; Larry, K3VX; Dan, KB3HVN, George-Anne, KB3HVN XYL



Additional Eagle Notes:

Stephen Moraco, KC0FTQ, announces the imminent release of a new user's guide for the CAN-Do! widgets to be used in Eagle.

The long awaited update describing all the features and function of the latest CAN-Do firmware will be released for public review and the CAN-Do Web site in the second half of August. The first draft has been reviewed by the team lead and the updates are being made to the document after which it will be posted to the Web site. An announcement will be made to the Eagle and P3E teams when the new version is posted later this month for review.



AMSAT at the 2007 Rochester Hamfest

by Richard F. Crow, N2SPI, n2spi@amsat.org

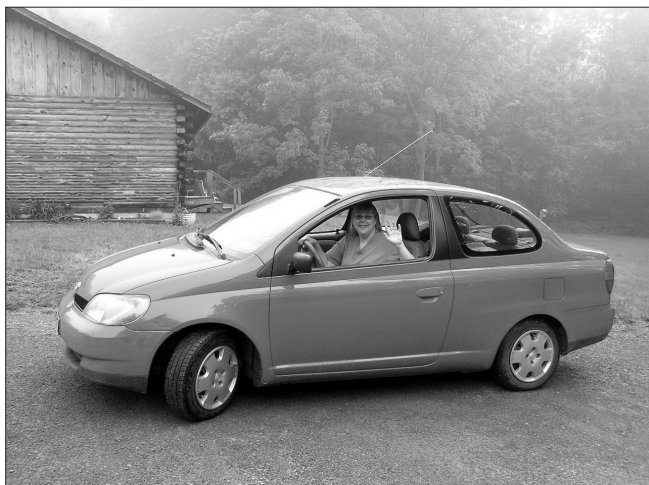


Photo 1: Early in the morning of June 1st, I'm ready to leave for the three hour trek to the Rochester, NY Hamfest. At the wheel is my wife Sally, KC2CCE, my #1 AMSAT booth assistant.

The Rochester Hamfest is one of the largest in the northeast USA drawing up to 8,000 people annually. It occurs on the first weekend in June and runs for three days, Friday, Saturday and Sunday. In 2007, this was June 1st, 2nd, and 3rd. Major vendors work out of indoor booths in a large domed exhibit hall (the Dome). The rest hawk their goods in an outdoor flea market billed as the "largest in the northeast". This year the Rochester Hamfest hosted the "ARRL Atlantic Division Convention". See "www.rochesterhamfest.org".

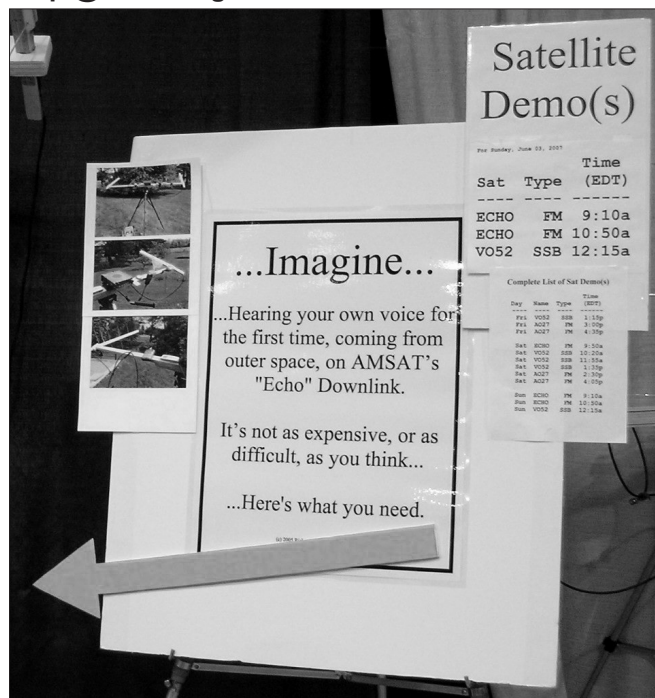


Photo 3: Above is a close-up of the large sign pointing to the satellite equipment exhibit. Again this year, the focus was on showing non-satellite hams how to work their first satellite. Note the listing of satellite demos. This year, I tripled them to include AO-27 and VO-52 along with AO-51. There were a total of 10 demos during the hamfest.



Photo 2: After arriving, we set up at Booth 45 in the Dome. AMSAT goodies for sale are on the table in the foreground. The table behind is my exhibit of "equipment needed to work a satellite". My low-cost BIY (Build-It-Yourself) satellite antennas don't show up well and are shown more clearly in Photo 5. Note the large sign to the right shown here and in Photo 3.



Photo 4: Here is a close-up of the satellite equipment exhibit. On the left are laptops running SatPC32 and InstantTrack, which we had for sale. The display to the right shows that with some free tracking, a 70cm HT, a 2m transceiver and the low-cost BIY antennas, one can work a satellite. To show I wasn't kidding, I used a duplicate set of this equipment in my demos.



Photo 5: These are my BIY antennas made from aluminum wire and foam board strips laminated with double-sided tape. I wrote three articles about them, and more, which you can download at: "<http://www.amsat.org/amsat-new/information/faqs/crow>". After demos, many wanted to get started, so I gave them this URL.



Photo 8: Jim Sanford, WB4GCS, AMSAT Eagle Project Manager, paid us a surprise visit. (I'm on the left, Jim is right.) Jim was there to receive the "ARRL 2007 Atlantic Division Technical Achievement Award" to be presented at the banquet later that Friday evening for his work on Eagle.



Photo 6: Traditionally, as in several past years, Dave Oman, VE3SAT, and his wife Anne showed up to help out for all three days. Around 1979, Dave's station was an AO-7 command station and he has stories to tell.



Photo 9: The first demo was with AO-27. For the FM satellites, I use an Alinco DJ-S40T UHF HT (clipped to right pants pocket) and Icom IC-2100 2m transceiver (clipped to belt), the same equipment as in the "exhibit". Photo by Dave Oman.



Photo 7: At 12:00 noon Friday, the Dome doors opened for the first time and the crowd descended upon us. Business was good.



Photo 10: Later, a second AO-27 demo was performed before Friday's closing at 5:30. Photo by Dave Oman.



Photo 11: Next day, Saturday June 2nd, the Dome opened at 8:30 AM. Again, business started out briskly. I've been running the AMSAT booth at the Rochester Hamfest for 7 consecutive years now, since 2001. This hamfest was average in terms of money raised for AMSAT, but about 20% less than last year.



Photo 12: This is a group forming for a VO-52 demo. For the SSB downlink note the Yaesu FT-290 2m all-mode clipped to my belt. On my other side is an FT-790. Photo by Scott Haller.



Photo 13: Here's the VO-52 demo. Since I'm using headphones, note the amplified speaker on a tripod so the crowd can listen in. Many of you worked me during the hamfest and I thank you. I can tell you we created a whole lot of interest in satellites and AMSAT that weekend. Photo by Scott Haller.

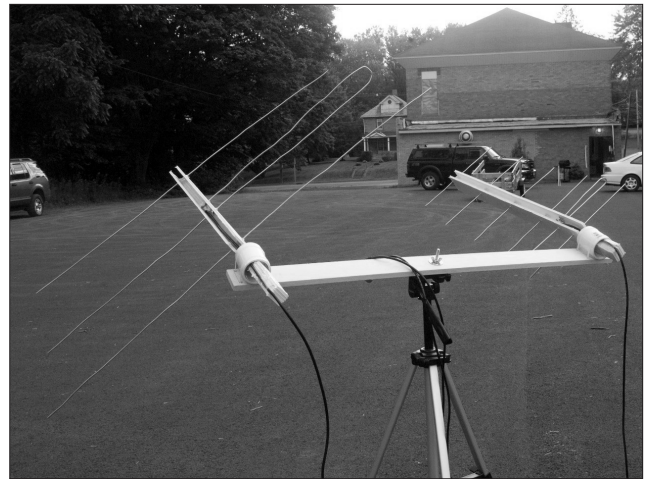


Photo 14: Some were so impressed with last year's demos they came back to see them again. Several have built my BIY antennas. Pictures of antennas made by George, WB2VUN, are on the large sign in Photo 3. Shown here are the antennas made by Scott, K2CK. Photo by Scott Haller, K2CK.



Photo 15: Things got slow Saturday afternoon. But we stayed until the doors closed at 5:30. Then Dave and I and our wives wound down by going out to dinner at one of Rochester's finer steakhouses.



Photo 16: At 8:30 Sunday morning, we were back again. It was really slow, probably because the flea market disappeared overnight. Nonetheless, we did two more Echo demos. At 1:30, the doors closed on the 2007 Rochester Hamfest for good. All in all, it was a good hamfest. Photo by Dave Oman.

Learn DSP By Programming Your PC, Part 1

by Richard F. Crow, n2spi@amsat.org

Copyright © 2007 by Richard F. Crow

Introduction

For at least fifteen years now it seems DSP (Digital Signal Processing) has been slowly infiltrating the Amateur Radio and electronic hobbyist community. A year ago, AMSAT announced that its Eagle satellite, currently in development, will carry DSP technology in the form of Software Defined Transponders. Then there's the HPSDR (High Performance Software Defined Radio) project that involves many of the same folks working on Eagle (<http://hpsdr.org/>). And there's even talk that SuitSat II will carry DSP based radios.

So what is this DSP thing anyway? How does it really work? How can you write your own DSP software to do what YOU want? In the early days of Amateur Radio, hams built, operated and experimented with their own homemade equipment to learn the new science of radio for themselves. My goal is to explain, step by step, in the simplest possible terms, how to write, run and experiment with your own DSP software so you can learn the new science of DSP for yourself. And I've tried to do this so that no previous programming experience is required.

Specifically, using a series of articles, I propose to show you how to program a PC running Windows XP to access the signal samples coming into and out-of your sound card. I will then build on this capability to show you how to write the software for a simple 3 KHz FIR (Finite Impulse Response) low pass filter. More exactly, I'll show you how to create a 31 tap, windowed-sinc, convolution-based filter using a Blackman window. Not sure what this means? All will be explained as we go along, or I'll tell you where to look in reference [4]. Once you understand one FIR filter, you'll understand how to write the software for similar high pass, band pass or notch filters; whatever you need.

OK, OK, this hardly covers the width and breath of DSP. But to attempt to teach all aspects of DSP programming I would have to write a six page article for every AMSAT Journal for the next 100 years (Get busy Richard! – Ed.). Just to explain the FIR filter, I'll have to crunch into several AMSAT Journals the equivalent of one or more chapters from each of several textbooks in a dozen different subject areas. In any

event, if you write and run all the software in these articles, you should have a solid foothold from which to experiment with other techniques for creating convolution-based filters, not to mention, investigate other areas of DSP.

What You'll Need

To run the software in these articles, you'll need:

- 1) A PC running Windows XP
- 2) A standard PC sound card, or equivalent
- 3) A microphone connected to your sound card, or other signal source
- 4) A set of speakers connected to your sound card
- 5) The capability to download free software from the Internet

Now, for the record, a PC running Windows is not my first choice to write DSP programs. Programming DSP using Windows is unnecessarily complicated and problematic. I would much rather have done this using a system designed specifically for DSP such as the legendary ADSP-2181 EZ-Kit Lite from Analog Devices or its current replacement, the KK7P DSPx module plus KDSP10 interface board (www.kk7p.com/dsp.html). Unfortunately, the DSPx plus KDSP10 together cost \$148 at the time this was written and the KDSP10 is a kit, which requires soldering.

So, not wanting to lose 99% of my audience, I eventually decided to settle for the PC that would cost most of you \$0 beyond what you have already spent. Perhaps in the future, I'll rewrite these articles to target the DSPx and KDSP10 or their equivalents. Having made this decision, it suggested that I also select software tools for this project that also cost \$0. This in turn dictates that we use the C programming language since, if we want to use free software that's reasonable in size and simplicity, the Windows interface, which is available to us, is written in C.

Now, I realize many of you don't know C. But if nothing else, type the program listings exactly as shown and the DSP software should run just fine. Along the way, however, I hope you do start to learn C as it is also the high level language of DSP. For example, the professional software development tools for the Analog Devices family of DSP processors, such as in the DSPx, are based

on C. As we go along, I'll try to assist you in the C learning process.

Now, as much as I would like to start chasing signal samples right away, we first need to build the programming infrastructure for cranking out C code. Specifically, we need to put together a text editor, C compiler, linker and other software. Doing all this will consume the rest of Part 1 of this article. So, let's develop a C programming environment by going through the C programming process step by step. Traditionally, the first C program taught to beginners displays the message "Hello world!". Consider Figure 1.

Step 1: Select a Text Editor

The first thing we need to do is to type the text in Figure 1 into a C source code file named, say, "Pgm1.c". For the C compiler to work, the file Pgm1.c must contain plain text only. The software that produces such files is called a text editor. Every copy of Windows XP comes with Notepad and DOS Edit, which are simple text editors. There are also zillions of more feature-packed text editors out there, some free and some not. Do not use a word processor, such as WordPad or Word, unless you know what you're doing. I'll leave it up to you to find a text editor you like. Right now, take a moment to boot up your PC and use NotePad, if nothing else, to type up the listing in Figure 1. If you never heard of NotePad, click on Start > All programs > Accessories > NotePad.

Step 2: Install a C Compiler/Linker

Now that we have Pgm1.c, we need a C compiler to convert it into a "Pgm1.obj" object code file that contains the machine language version of Pgm1.c. We then need a Linker to combine any and all ".obj" files, plus any needed ".lib" files, into an executable "Pgm1.exe" file. (Each .lib or library file consists of a related collection of computer code for doing frequently needed things like inputting keyboard characters and displaying text, or performing standard math operations.)

To this end, I've selected the free C compiler/linker from Digital Mars. To download it, go to <http://www.digitalmars.com/download/freecompiler.html>, scroll down and click on "Digital Mars C/C++ Compiler Version 8.49". This will download a file named "dm849c.zip". Then, scroll down some



more and click on “Basic Utilities”. This will download a file named “bup.zip”. And last but not least, send if you can Digital Mars the modest \$39.00 they’re asking for their more comprehensive C/C++ CD. Good work like this needs to be encouraged so that it doesn’t dry up.

Now, get some documentation by going to the Digital Mars home page at www.digitalmars.com. Look for the word “Documentation” on the upper right side and, under that, click on “Compiler & Tools Guide”. When you get a chance, read as much of this as you can. Realize, however, that the C code examples given here will only work in a DOS command line environment such as the DOS window described below.

Now, unzip “dm849c.zip” and you’ll get bunch of new folders at “c:\dm849c\dm\...” filled with a bunch of new files. In the old days, some 15 years ago, the resulting C compiler and linker would have been sufficient. But try as hard as I might to minimize the number of tools and files so as to keep things simple, the complexity of Windows forces us to need at least one more tool, a “resource compiler”. So, unzip “bup.zip” to get “rc.exe” the Digital Mars Resource Compiler. We won’t need the other tools from “bup.zip”, so delete them if you wish.

The good news is the Digital Mars package is a nice little free C compiler/linker. The bad news is (well, not that bad) it’s a command line compiler/linker suitable for a PC operating system from a previous era, namely DOS. Perhaps that’s why it’s free. Some of you remember DOS I’m sure. But if you don’t, I’ll review it next.

Step 3: Learn a Little DOS

Now, I realize using DOS to do anything these days is horribly unfashionable. But the truth is, I can explain how to perform a particular action faster and more concisely typing one DOS command than I can navigating through a maze of mouse clicks intertwined with keyboard entries. Also, if I were to do this with Windows, the Window’s user interface can be custom configured in so many ways it’s impossible to know if the window I see will be the window you’ll see. And despite what the proponents of Windows say, DOS is so simple I can describe how to use it in one sentence. Specifically, to get DOS to do something, type in the appropriate DOS command, followed by any needed command arguments and press the Enter key. This is the classic command line interface.

To open a DOS window in Windows XP, click on Start > All Programs > Accessories > Command Prompt. Right click on Command Prompt then click on Create Shortcut. Drag

the Shortcut out onto your Desktop. You can right click on this shortcut to access the DOS window’s Properties. Investigate and experiment with these properties. Chances are, you’ll want to personalize many of them. For example, I like to open with a maximized DOS window using the 8x12 font. From now on, to open a DOS Window for this project, double-click on this shortcut. Take a moment right now to boot up your PC and open a DOS window. Looking at the DOS window, the line of text closest to the bottom of it should look something like:

```
C:\... >
```

where “...” is some file directory path. The last character, the “>”, indicates this is a command prompt, meaning it’s your turn to type a command on the keyboard if you wish. Let’s type the following command. (Where you see “<enter>”, don’t type it, just press the Enter key.)

```
cd \ <enter>
```

The DOS command “cd” means change directory. (A directory in DOS is the same as a folder in Windows.) The command “cd \” means wherever you are in the file structure, change directory to the root directory. Now, all of you should see:

```
//001) Filename:      Pgml.c, version 1.0
//002) Description:  A first C program for Windows XP
//003)                which creates a Message Box that
//004)                displays the message "Hello world!"
//005) Programmer:   Richard F. Crow, N2SPI, July 25, 2007
//007) (this line reserved)
//008) (this line reserved)
//009) (this line reserved)
//010) (this line reserved)

#include <windows.h>                //012) (preproc'r inserts text in ".h" files..
//013)    ...so pgm gets needed 'C' definitions)

int WINAPI WinMain(                //015) WinMain() starts applicat'n:
    HINSTANCE hInstance,           //016)=a number that identifies...
    HINSTANCE hPrevInstance,       //017)..this occurrence of this app
    PSTR      szCmdLine,           //018)=ptr to cmd line text, if any
    int       iCmdShow )           //019)=init'l window (maximzd?, etc)
{
    MessageBox(                    //021) call MessageBox() function:
        NULL,                     //022)=I.D. of owner window (none)
        TEXT( "Hello world!" ),   //023)=pointer to text in MessgBox
        TEXT( "Pgml, v1.0" ),     //024)=pointer to MsgBx title text
        0 );                     //025)=style of MsgBx (DefaultUsed)

    return( 0 );                  //027) quit WinMain, rtn 0 to WinOS
}
```

Figure 1: Pgml.c



C:\>

Next, type the command:

help |more <enter>

(Note: the “|” character before more is the upper case character of the \ key, just above the Enter key.) This displays as much text as will fit in the DOS window without scrolling off the top. Press the Enter key to get the next line of text. Keep pressing the Enter key until you reach the command prompt again. This is a list of all the DOS commands, and essentially, that’s all there is. Once you learn a DOS command, but forget the details, you can use the help command to refresh your memory. For example, to get help on the purpose and use of the “cd” command, type:

help cd <enter>

Finally, to terminate a DOS window, at the DOS command prompt type:

exit <enter>

Though not absolutely necessary for these articles, it would be helpful to learn more about DOS from the Internet, various books and the help command. If you absolutely abhor DOS, you can use Windows Explorer (not Internet Explorer) to accomplish the same tasks. If you never heard of Windows Explorer, click on Start > All Programs > Accessories > Windows Explorer or right click on Start and click Explore.

Step 4: Test Tools, Make Folders

Now that we know a little DOS we can test things out and set up a file structure to bring some order to our programming environment. Take a moment to open a DOS window, if one’s not open already, then enter the following two DOS commands, one at a time:

cd c:\dm849c\dm <enter>

dir /p <enter>

These commands navigate to “c:\dm849c\dm” and then display the files and subdirectories there. Note the readme.txt file. Let’s use DOS Edit to read it. To do this, type:

edit readme.txt <enter>

Once Edit has been opened note the menu bar across the top. To access the File menu, hold down the Alt key and press the F key, and so forth. Press the Esc key to erase a menu. Press F1 for help, such as it is. To quit Edit, hold Alt and press F then X. The readme file will mean something to expert readers. If it doesn’t mean much to you, don’t worry about it.

Now, let’s test our compiler/linker by navigating to “c:\dm849c\dm\bin”, clearing the DOS window, and executing the C compiler/linker “dmc.exe”. If the compiler/linker is working, you should see a multi-part message telling experts how to use it. Type:

cd c:\dm849c\dm\bin <enter>

cls <enter>

dmc <enter>

Next, let’s set up and test the Resource Compiler. First, remember where you left the file rcc.exe and use the DOS copy command to copy it into “c:\dm849c\dm\bin”. For example, if rcc.exe is in c:\temp1, you might navigate to c:\dm849c\dm\bin, if not already there, and type:

copy c:\temp1\rcc.exe rcc.exe <enter>

There are easier, shortcut ways to do this in DOS. But I don’t have time to explain all the details, so I’ll leave it to you to find out how. For now, you may find it easier to copy files by dragging them around inside Windows Explorer. When ready, navigate to “c:\dm849c\dm\bin” (if not already there), clear the DOS window, and execute the file rcc.exe. If rcc.exe is working, you should see its message describing its use. Type:

cd c:\dm849c\dm\bin <enter>

cls <enter>

rcc <enter>

And finally, let’s create a subdirectory, or folder, off of c:\dm849c\dm\bin named Program1. (Note: DOS likes directory and file names of 8 characters or less.) Program1 will be the unique location where we will store Pgm1.c along with the many files that issue from it during the compilation and linking process. Other C programs will be stored in their own subdirectories that will be

created as needed. To do this, be sure you’re still in c:\dm849c\dm\bin, then type:

md Program1 <enter>

md is the DOS command for make directory. Next, remember where you left Pgm1.c and copy it into c:\dm849c\dm\bin\Program1. Then, use the cd command to navigate to c:\dm849c\dm\bin\Program1, if necessary and use the dir command to verify that Pgm1.c is there, and in fact, is the only file there.

Step 5: Compile/Link the Source Code

While still in c:\dm849c\dm\bin\Program1, compile and link Pgm1.c by typing:

.. \dmc pgm1.c <enter>

(“..” means navigate up one level in the directory tree. In other words, momentarily move up to c:\dm849c\dm\bin to find dmc.exe, which is where it should be.) Now see what’s in c:\dm849c\dm\bin\Program1. That is, provided there have been no compiler/linker error messages in the mean time. Among other new files, you should see Pgm1.exe that is the executable version of Pgm1.c. If so, type:

Pgm1 <enter>

Now, a little message box should pop up which displays “Hello world!”. If so, congratulations! Many of you just wrote, compiled and ran your first C program for Windows.

Step 6: Learn a Little C

Let’s go through Pgm1.c line by line. In line 001, the first two characters “//” signal the beginning of a comment. When the compiler sees “//” it ignores the rest of the characters on that line and goes to the next line. The next four characters, “001)” are the line number. I put these in every comment because it’s the quickest way to identify a particular line when discussing it. Read the rest of the comments in Pgm1.c to see what each line does. I realize some comments may be a little cryptic, so study them carefully. To keep program listings compact, I kept comments short.

To ease your burden when typing up the C source files, you may leave out the comments. See Figure 2. If you remove the “//”, be sure to remove the text which follows. Take a moment to experiment with this. In Pgm1.c, eliminate the “//” in line 001 but not the text that follows. Now save it and compile it (repeat the first part of Step 5) to see what a compiler error looks like. When done, fix this so the error goes away.

```
#include <windows.h>

int WINAPI WinMain(
    HINSTANCE hInstance,
    HINSTANCE hPrevInstance,
    PSTR      szCmdLine,
    int       iCmdShow )
{
    MessageBox(
        NULL,
        TEXT( "Hello world!" ),
        TEXT( "Pgm1, v1.0" ),
        0 );

    return( 0 );
}
```

Figure 2: Pgm1.c without comments.




```

//001) Filename:      Pgm1.rc, v1.0 (to be copied/renamed d2a.rc later)
//002) Description:  Resource script to make d2a.res resource file
//003)                that goes with d2a.c, a pgm that generates sine
//004)                wave samples xmitted thru sound card's D/A output
//005) Programmer:   Richard F. Crow, N2SPI, July 25, 2007

//007) (this line reserved)
#define IDC_TEXT1  1000 //008) (must match same #define in d2a.c)
#define IDC_TEXT2  1001 //009) (must match same #define in d2a.c)
#define IDC_SCROLL 1002 //010) (must match same #define in d2a.c)

#include<windows.h> //012) (preproc'r inserts text in".h"files..
//013) ...so pgm gets needed'C'definitions)

d2a_resources DIALOG DISCARDABLE 100, 100, 200, 50

STYLE WS_MINIMIZEBOX | WS_VISIBLE | WS_CAPTION | WS_SYSMENU

CAPTION TEXT("D2A, v1.0: Pgm to Output D/A Samples")

FONT 8, TEXT("MS Sans Serif")

BEGIN
    CTEXT TEXT("Sine Wave Generator"), IDC_TEXT1, 60, 4, 80, 8
    CTEXT TEXT("Frequency: 5000 Hz"), IDC_TEXT2, 60, 14, 80, 8
    SCROLLBAR IDC_SCROLL, 10, 28, 180, 12
END

```

Figure 3: Pgm1.rc

Going to line 012, any command which begins with '#' is C preprocessor command, or directive. The preprocessor directive, `#include <windows.h>`, causes the text in the file `windows.h` to be inserted into `Pgm1.c` at line 012. In a nutshell, a preprocessor directive adds, selects or alters text in the C source file before the compiler scans it. An `.h` file, as in `windows.h`, is called a header file or include file and it defines certain standard, boilerplate C entities which may be referenced in the C source file.

Now go to line 015 where the action really starts with `WinMain`. `WinMain` is the name of a function. Functions are blocks of computer code that perform a particular, well, function. Functions are like subroutines. Functions are invoked, or called, by some higher level function or software. When you execute a program, you're signaling the Windows OS (Operating System) that you have an application to run. In response, the OS allocates some RAM for your program, loads it, and then runs it, or more correctly, calls it as a function. When programming for Windows, you must name your top-level function `WinMain`.

Right after `WinMain` is a '(' followed by a list of variables, known as arguments, which ends with a ')'. In `Pgm1.c`, `WinMain()` has four arguments, `hInstance`, `hPrevInstance`,

`szCmdLine` and `iCmdShow`. In a nutshell, the software which calls `WinMain()` assigns values to these arguments and then calls `WinMain()`. `WinMain()` can use these values, or not, as inputs to its computations. The text "int WINAPI WinMain (arg1, ..., arg_last)" is called the function header.

After the function header is the function body which starts with a '{', in line 020 and ends with a matching '}', in line 028. The function body consists of statements. In C, computer instructions are called statements. The end of a statement is denoted by a ';'. Because of this, there can be several C statements on a single line, or one statement may be spread over several lines. An example of several C statements is:

```

float ItemPrice;
float SaleTaxPercentage;
float MyCost;
ItemPrice = 5.57;
SaleTaxPercentage = 0.04;
MyCost = (SalesTaxPercentage * ItemPrice)
+ ItemPrice;

```

(* is the operator for multiplication.) Note that a statement can also be used to declare a variable. This is where a variable is defined by first stating its type, such as `float` and then stating its name, such as `ItemPrice`. Basic variable types are `void`, `char`, `int`, `float`, `double` along with extensions and variations

of same. In addition, these basic types can be reincarnated into more sophisticated variables known as arrays, pointers, structures and unions. To become skillful at this kind of Windows programming, it's important to get comfortable with using pointers, structures and pointers to structures.

In `Pgm1.c`, there are two statements in the `WinMain()` function body. The first statement, spread across lines 021 to 025, calls the function `MessageBox()` which is part of Windows and creates the Hello world! message. Note that values are assigned to the `MessageBox()` arguments right in its argument list. The second statement, in line 027, returns a value of zero to the Windows OS. The `int` before `WinMain()` specifies this return value will be type `int`. The `WINAPI` before `WinMain()` is #defined inside `windows.h` so as to be replaced with the string `__stdcall`, a technical detail. In conclusion, functions are the computational backbone of C. A C program basically consists of functions, calling functions, calling functions. Though not absolutely necessary, it would be helpful to learn more about classic C (not C++, not C #, not C++.net, nor C#.net) from the Internet and books.

Step 7: Create a Resource Script

In the world according to Windows, icons,

fonts, menus, dialog boxes, etc., standard objects used to make the Windows user interface, are generated from resource data. Unless resource data is predefined, as for some stock object, it has to come from a resource file, a file with extension .res. A resource file is produced by a resource compiler which takes its input from a resource script, a file with extension .rc. A resources script is another plain text file you create with your text editor.

Let's take a moment and create a resource script. Now, before going on, note that no resource file is needed for Pgm1.c. But next, in Step 8, we'll need to feed a resource file to the compiler/linker, even if it's a dummy file. And in the next article in this series, Part 2, we'll need a resource file named d2a.res. So while we're at it, let's type up the resource script to make this resource file. For file name consistency, we'll call it Pgm1.rc, for now. Later, when we get to Part 2, we'll copy it and rename it d2a.rc. To do this, open a DOS window, navigate to c:\dm849c\dm\bin\Program1, if not there already, and type:

```
edit Pgm1.rc <enter>
```

Type in the program listing shown in Figure 3 and make sure it gets saved in c:\dm849c\dm\bin\Program1.

(Note: The '[' character in line 017 of Pgm1.rc is the upper case of the '\ ' character.)

Step 8: Automate the Compile/Link Step

The compiler/linker so far has been a little out of control. This is because none of the many compiler/linker options have been specified, forcing it to assume things which ain't necessarily so. Also, DOS sometimes requires a lot of tiresome typing, such as "cd ... " this and "cd ... " that. Let's solve both problems.

A nice feature of DOS is its batch file

capability. A batch file is a plain text list of DOS commands which has the file extension .bat. Instead of typing the same sequence of DOS commands over and over, we can put them a batch file and then simply execute it. Right now, let's take a moment to create a batch file. First, open a DOS window and navigate to c:\dm849c\dm\bin\Program1, if not there already. Then, create a batch file named Make.bat by typing:

```
edit Make.bat <enter>
```

Type in the program listing shown in Figure 4 and save it in c:\dm849c\dm\bin\Program1. When you get back to the DOS command prompt, type:

```
make <enter>
```

Now, Pgm1.c will be compiled and linked, just as before. But this time you don't have to type as much, and now, the compiler/linker is doing what we want.

Let's learn a little about batch files and compiler/linker options by going through Make.bat line by line. In line 001, REM denotes a batch file comment, so this line is ignored. In line 007, the batch file command echo on insures that lines in the batch file will be displayed as they are executed. In line 008, the DOS command cls clears the DOS window, as we've seen before. In line 009, the resource compiler, rcc.exe, is invoked using its full file path to compile Pgm1.rc. After that, the resource compiler switch, -32 causes a 32 bit resource file to be generated. In line 010, the C compiler/linker, dmc.exe, is invoked using its full file path to compile and link Pgm1.c. After that:

```
winmm.lib  links Windows MultiMedia
            library for sound card access
comctl32.lib links common controls such as
            progress bar used later
-mn        selects the default Win32
            memory model
```

```
-WA        generates a Windows .exe
            file
```

```
-L/RC      tells linker to copy resources
            from the .res file
```

```
-L/SUBSYSTEM:WINDOWS:4.0
```

```
tells linker to make a Windows
XP app
```

And finally, in line 011, the batch file pause command keeps the DOS window from disappearing if Make.bat is invoked from Windows Explorer and the close on exit property is selected or built-in. This gives you the chance to view resource compiler or compiler/linker errors, if any.

Since the programming environment is now in place, we don't need to repeat everything we've done so far. From now on, for this series of articles, the C programming process is simply:

- 1) Type up the C source code and save as a ".c" file
- 2) Type up the ".rc" resource script
- 3) Run Make.bat to produce an ".exe" file
- 4) Run the ".exe" file

Step 9: In Case of Trouble

First, check your typing very carefully to make sure you've entered text from the various listings exactly as shown.

Second, use NotePad to open any and all files you typed from this article. If you see any garbage characters, you're not using a suitable text editor.

Third, I'm going to try to make it possible to download the files mentioned in these article, including the .exe executables, from the AMSAT Web site, www.amsat.org. If and when this happens, download the files and compare them to yours. Try compiling/linking the downloaded files and running them to see if any problems exist with your compiler/linker or PC.

```
REM  Filename: Make.bat, version 1.0
REM  Description: Compiles .res resource file from .rc resource script.
REM  Then, compiles .c source file and links it using the specified options.
REM  NOTE: To make .exe file for source other than Pgm1.c, change "Pgm1" in
REM  lines 9 and 10 to new "name". Name must match for both .rc and .c files.
REM  Programmer: Richard F. Crow, N2SPI, July 25, 2007

echo on
cls
c:\dm849c\dm\bin\rcc Pgm1.rc -32
c:\dm849c\dm\bin\dmc Pgm1.c winmm.lib comctl32.lib -mn -WA -L/RC -L/SUBSYSTEM:WINDOWS:4.0
pause
```

Figure 4: Make.bat



Step 10: Homework (Optional)

First, if you have little or no programming experience, get and read *Code* by Charles Petzold to learn basic computer concepts. Even if you're an experienced programmer, read this excellent book. See reference [1]. Written for the layman in an engaging style, it starts with an interesting technical discussion of Morse Code which alone will be worth the purchase price for many hams. And when you finish you'll know more about how computer hardware actually works than 99% of the programmers out there.

Second, to learn the C programming language, read Sams *Teach Yourself C In 24 Hours* by Tony Zhang and John Southmayd. See reference [2]. This very good book will teach you classic ANSI C step-by-step.

Third, the interface to Windows we are using is the venerable Win32 API (Application Programming Interface). Read *Programming Windows*, Fifth Edition by Charles Petzold to learn the ins and outs of this vast subject. See reference [3]. This excellent book assumes you know C, but otherwise explains things clearly and thoroughly with lots of programming examples.

Fourth, some day there may be a better book that explains DSP in practical, easy-to-understand terms. But until then, *The Scientist and Engineer's Guide to Digital Signal Processing*, by Steven W. Smith is, in my view, the very best there is. See reference [4]. Read this book to learn about Linear Systems theory and convolution, which is the serious magic behind FIR filters. This book is available as a free download. But

if you can, order this book for the \$64.00 asking price so Mr. Smith can keep up the good work.

References

- [1] Petzold, Charles (2000), *Code*, Microsoft Press, Redmond, WA, ISBN 0-7356-0505-X, ISBN 0-7356-1131-9 (paperback)
- [2] Zhang, Tony, and Southmayd, John (2000), Sams *Teach Yourself C In 24 Hours*, Sams Publishing, Indianapolis, IN, ISBN 0-672-31861-X
- [3] Petzold, Charles (1999), *Programming Windows*, Fifth Edition, Microsoft Press, Redmond, WA, ISBN 1-57231-995-X
- [4] Smith, Steven W. (1997), *The Scientist and Engineer's Guide To Digital Signal Processing*, California Technical Publishing, P.O. Box 502407, San Diego, CA 92150-2407, www.DSPguide.com, ISBN 0-9660176-3-3



AMSAT is proud to offer this quality white polo shirt made of 100% combed cotton by Outer Banks for 2007. The shirt is short sleeve and has a collar and three buttons. A pocket is on the left. Appearing directly above the pocket is the AMSAT logo and name in red and Radio Amateur Satellite Corporation in blue. This shirt comes in medium, large, extra large, 2X large and 3X large. Quantities are limited.



More Symposium Notes:

SDX (Software Defined Transponder): There are 3 or 4 different versions of SDX being independently developed. At least one will be demonstrated at Symposium. If you are coming to Pittsburgh, bring your U/V capable rig!

ACP: A prototype phased array is being developed, based on the ideas Tom Clark, K3IO, has been developing for the ACP. We hope to demonstrate it at Symposium; bring your 2m and 70cm handhelds. This is a significant effort for many reasons. The phased array antenna system is mandatory for the digital communications package. The easiest way to implement the phased array is unacceptable in terms of mass, power, and heat. Tom has been applying basic mathematics and physics to develop simpler means of implementation, and one is about to be tested. Tom will present a paper at Symposium on the mathematics involved, the concepts, and the implementation. If you've never heard Tom speak, you're in for a real treat -- he has the rare ability to make apparently difficult mathematics intuitively obvious to the casual observer!"



This maroon 2007 Symposium Shirt with logo embroidered in gold may be ordered either in advance of Symposium for delivery at the Symposium. Check the AMSAT 2007 Symposium Web site for details.



Field Day Report

By Bruce Paige, KK5DO, kk5do@amsat.org

Once again Field Day has come and gone. There were some areas that were hot and dry, some hot and humid areas and some places where it was just perfect. By the reports that have been sent in, it looks like everyone had a really good time. In 2006, there were 21 participants that submitted entries. This year participation (13) was almost what we had in 2005 (11).

Taking away first place from the Lafayette DX Association, W9LDX, last year with 55 contacts was the Houston MosQRPitos, using the call W5MSQ with 53 contacts. Bringing up second place was our first place winner last year, the Lafayette DX Association, W9LDX with 37 contacts. Third place goes to Los Chupacabraderrros, N5JO, with 19 contacts.

Tying for fourth place is last year's second place winner, Backtothefuture, NX2Q, and the Lynchburg Amateur Radio Club, K4CQ, both with 16 contacts. Our top home station running on commercial power was Jim Von Striver, W6ASL. We also had one station operating with battery power - that was Patrick Stoddard, WD9EWK.

There were six satellites used this year with a total of 207 QSO's completed. AO-7 carried 69 phone QSO's and 21 CW QSO's. AO-27 carried 8 QSO's. AO-51 carried both l/u and v/u contacts and there were a total of 14 QSO's reported. SO-50 carried 11 QSO's and finally, VO-52 carried 30 phone QSO's and 4 CW QSO's.

Photos 1 and 2 show this year's winner, W5MSQ, operating from the Spark's Ranch way out west from Houston. Besides the cattle that were there last year, this year, there were many unwanted guests, mosquitoes. With all the rain we have been

having in south Texas, we have become a breeding ground for the little pests.

There was a lot of fun with all the satellites. To amass their high score, they operated all the available satellites in all modes. Andy, W5ACM, says "After the incredible rain of Saturday, but before the stampede of the Longhorn cattle at the Spark's Ranch west of Houston, Field Day was excellent via the hamsats. AO-7 was the star performer, but we were delighted with the results via AO-51 Mode L/U. We were operating QRP, and the 5W on 1.2 GHz did superbly due to the lack of competition, a clean antenna installation, low-loss coax and the patience of WA4SCA on the other end."

At the Lockheed Martin Recreation Association Radio Club, W5IU field day, the usual dedicated satellite station crew included - Keith Pugh, W5IU; Ray Hoad, WA5QGD; and Gary Persons, KD5DAY - did the setup, operating, and teardown. We also had help from Harold Reasoner, K5SXX. Keith, W5IU, had this to say about this year's field day "We were "Snake Bit" by two generator failures, but survived for another day. The old Mode L equipment from AO-10 and AO-13 was resurrected for the AO-51 Mode L/U task. The antenna used was one of four WD4FAB helix antennas that were originally built by W5IU for use at W1AW/5 when hosted at Arlington, TX, in the late 1980's. (See Photos 3, 4 and 5.) Two of these were actually mounted, but only one fed. Main station hardware consisted of two FT-817s, SSB Electronics up converter, SSB Electronics 10 watt amplifier, and Down East Microwave 30 watt amplifier. Tracking and all control functions were done by a notebook computer running SatPC32 with TX Controller for the second radio. VHF and UHF antennas were Hy-Gain Satellite

Pack. Rotors were Yaesu G-5500. Great fun and some frustration was had by all. By the way, AO-51 Mode L/U was a "hoot" and we actually worked a couple more stations, after a respectable wait, when no one answered them on the Sunday morning pass."

Bill Dawson, K5AXW, from the Los Chupacabraderrros, N5JO, entry had this to say, "Good year and lots of fun despite loss of FO-29 and a failed PC interface from the az/el controller but manual operation sufficed." Their antennas are pictured on the right.

Jim Von Striver, W6ASL, had some fun and had this to say, "This was my first field day on satellite. Stations were stacked 10 deep! I will do better next year now that I know what to expect."

Finally, one more picture, (Photo 6) from the Parker County ARC & Tri-County ARC, W5PC/N0JY, group. Jerry Buxton, N0JY has this to say, "Corrupted elements on two birds - never heard ISS and VO-52 came up well before the predicted pass! That caused suspicion but had to wait until I returned home Sunday to compare with other PCs and verify. Next year - compare before Field Day!"

Next year, I hope that we have even more participants in the AMSAT Field Day and Murphy continues to show his presence around the country, visiting several sites.

73 and Good DX,

Bruce, KK5DO

Here is a table of all entries received. In the case of a tie in the contacts, the call signs are listed alphabetically. ☺

1	W5MSQ	53
2	W9LDX	37
3	N5JO	19
4	NX2Q	17
5	K4CQ	16
6	W5PC	16
7	KF4XB	9
8	W5IU	9
9	W9LO	9
10	W6ASL	8
11	N5AFV	6
12	W8NP	5
13	WD9EWK	3

More pictures on the next page.



Photo 1: W5MWQ at the Spark's Ranch.



Photo 2 W5MSQ operating station inside the pop-up trailer.





Photo 3

Photos 3-5: From the W5IU station at Lockheed Martin, L/U antennas.

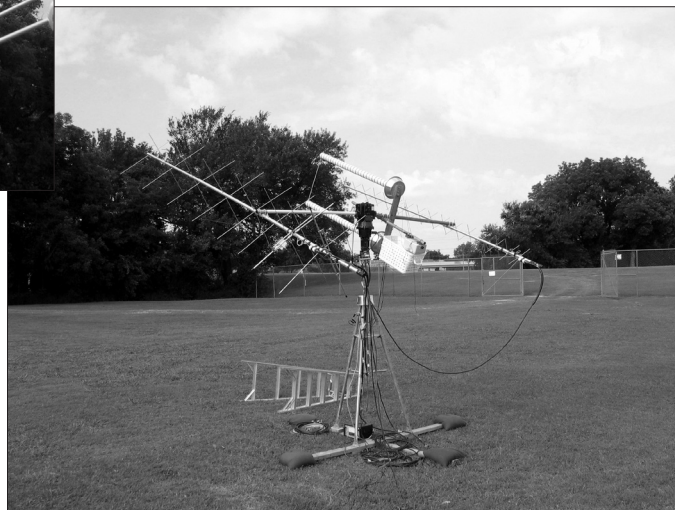


Photo 4



Photo 5

Photo 6: W5PC/N0JY Parker County ARC & Tri-County ARC operating station.



Blind Man Experiences Satellites by Maurice-André Vigneault, VE3VIG, vig@mondenet.com

The Ottawa Valley Mobile Radio Club (OVMRC) participated in the AMSAT Field Day in a very special way this year. Graduates from the satellite communications-training course, given at the VE3JW station, enthusiastically embarked on their own satellite antenna-building project. Terry, VE3TWC, showed up at Field Day with a replica of AA5FR remote-controlled Arrow II satellite antenna mounted on a camera "tripod and rotor". Others showed up with simple mobile radio/antenna combinations.

However, for the club's Field Day satellite contact we concentrated on Jerry's, VE3QSO, satellite set-up. Jerry is a blind radio amateur who has completed and graduated from the Sat Com course, making voice and CW contacts during the hands-on portion of the training. He wanted to build a portable "satellite in the park" station from the ground up. His engineering qualifications came in handy for the design portion of his project. A sturdy tripod, a 7-foot mast, a light azimuth rotator, a 7-element Yagi on VHF, and a helical beam on UHF, which he borrowed the idea from our satellite guru, Clare Fowler, VE3NPC.

For FD, the antenna group was connected to a Yaesu FT-847 radio, to the rotator remote control, and using a laptop for satellite tracking, all powered by a 100 AH deep cycle battery. Although the beams had been carefully matched and tuned, none of the equipment had been tested live before FD. When disassembled, the whole antenna unit including mast and tripod, but not the helix, is rolled up in a tarpaulin into an easily transportable bundle.

On Field Day, Matthew, VA3MHB, assisted Jerry and they first tested the setup with local contacts and then by listening to satellites passes. Reception was good on VO-52, VHF downlink and on the AO-51 UHF downlink indicating that both beams were performing. The next step was to attempt a contact. Unfortunately, the traffic on the available satellites was so intense that they could not log a call at 5 to 10 watts of power. Nevertheless, next weekend, it will be back in the park for a less hectic trial.

The photo below shows from left to right Doreen, VE3CGO, and Ed Morgan, VE3GX, life members of the OVMRC, Clare Fowler, VE3NPC, AMSAT coordinator, Matthew, VA3MHB, Jerry Neufeld, VE3QSO, and Mandy his seeing-eye dog.

The Satellite Communications course is an ongoing training endeavor by the OVMRC and it is hoped that this short story will encourage others to get ready for the upcoming P3E Express and Eagle satellites.

73,

Maurice-André Vigneault, VE3VIG
Amateur Radio Exhibit Group VE3JW
Ottawa Valley Mobile Radio Club at
Canada Science and Technology Museum
Ottawa, Ontario, Canada 📶



OVMRC Satellite Field Day Station, VE3QSO.



amsat.org

Exciting new look!
Great new features!
Easy to maneuver!

Try it, you'll love it !

THE R.F. CONNECTION

"Specialist in
R.F. Connectors and Coax"
<http://www.therfc.com>

301/840-5477
Fax 301/869-3680
E mail: rfc@therfc.com

Order Line 800/783-2666
Suite 11, 213 N. Frederick Ave.
Gaithersburg, MD 20877



Morse For the Fun of It

by Ray Soifer, W2RS, w2rs@amsat.org

While I share his objective of letting educators and their students know how easy it is for them to become radio amateurs, my friend Paul Shuch, N6TX's recent column (*The Orbital Classroom* No. 8, May/June 2007) does Morse code something of an injustice. It is my purpose here to fix that.

Paul writes that the FCC, by its actions, apparently considers Morse obsolete. In some respects, so it is. But, so is the horse as a means of everyday transportation. That does not stop millions of people from riding horses for fun and millions more from having fun watching them compete. Horses also still find useful employment in specialized roles, such as police crowd control in New York City and herding cattle here in southern Arizona where I live. And just think, if concern over climate change gets any stronger, horses might stage a comeback. Not only do they produce less carbon dioxide than cars, but their fuel is 100% biomass and they even recycle some of it as fertilizer! In the same spirit, Morse is far more spectrum-efficient than SSB and requires less power for the same propagation path.

Be that as it may, if not for the fun of it, why are we radio amateurs? "Solely with a personal aim and without pecuniary interest," says paragraph 1.56 of the ITU radio regulations. Thousands of hams, myself included, have more fun pounding brass than speaking into microphones or typing into computers. Radiotelephone has been around since 1902 and SSB since 1923, but more than a few hams continue to prefer Morse for much, sometimes all, of their

operations. And not all of us are "aging" as Paul and I are, at least no more so than radio amateurs in general. Try entering the worldwide All Asia CW contest sometime, where the operator's age forms a part of the exchange (ladies send "99"), and you'll find that the age distribution pretty much mirrors that of the general ham population.

Paul notes that a Morse test is no longer required to use and control stations in the amateur satellite service. True enough, but that is nothing new. It happened in 1990, when U.S. Morse tests for operation above 30 MHz were abolished. The rules governing frequencies below 30 MHz have now followed suit, but no satellites currently have uplinks in that range and I'm not aware of any that are planned.

Is the use of Morse code in Amateur Radio "declining," as Paul writes? Well, that depends. In percentage terms, yes, as newly licensed "no-code" hams continue to populate the 'phone bands. In absolute numbers, however, CW is more than holding its own. FISTS membership, for example, has grown rapidly since Morse tests were ended. Entries in ARRL CW contests have increased in recent years, as they typically do when the sunspot cycle declines because CW often gets through under poor conditions when SSB does not.

As for the use of Morse code on satellites, no reliable statistics exist. I can tell you, though, that activity and "Best Fist" nominations in AMSAT's annual Straight Key Night on OSCAR during the last several years have been the best ever since the demise of AO-13. I'm hoping that P3E and Eagle will keep that going for many years to come.

Paul goes on to say that "the predominant digital mode used on today's birds is ASCII, not Morse." Many university-based satellites, however, such as the currently operational CO-56, CO-58, and HO-59, also include Morse CW beacons, not as a primary telemetry channel but as a means of satellite identification especially during the immediate post-launch period. Such beacons also allow listeners around the world to track the satellite, even if they are not equipped for data communications. Linear transponder birds, including AO-7, FO-29 and VO-52, have them too.

By the way, for readers interested in including a continuous beacon (Morse or otherwise) in their forthcoming satellites, the IARU Satellite Advisory Panel strongly suggests that you consider using 435 MHz or higher frequencies (as do the operational Cubesats mentioned earlier), since the 145.8-146.0 MHz segment is very much overcrowded.

If you're a not-yet-licensed student or educator, what should you make of all this? First, as Paul says, be thankful that FCC doesn't require you to take a Morse test. Hams have been forgetting their Morse code after passing their tests for decades, much as I've largely forgotten the calculus I learned in school (my work didn't require me to use it). But, take it from me, those hams who forgot the code, or who never learned it, are missing a great deal of enjoyment. So, after you've gotten your license, why not learn the code at your own pace? There's no quiz any more, just the fun of using it on the air.



from page 31 - Voyager reception at Bochum ...

http://www.amsat-dl.org//index.php?option=com_content&task=view&id=142&Itemid=97

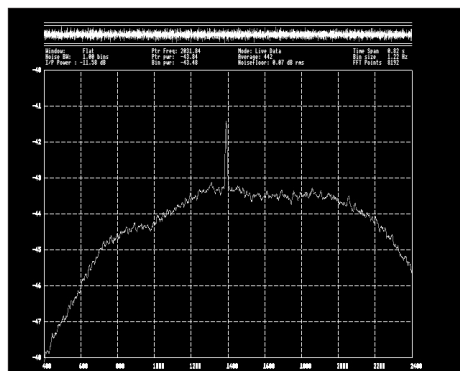
Congratulations to our AMSAT-DL/IUZ team in Bochum for this huge achievement. It also demonstrates now officially that the 20m dish is good enough to support the AMSAT P5-A Mission to Mars.

73,

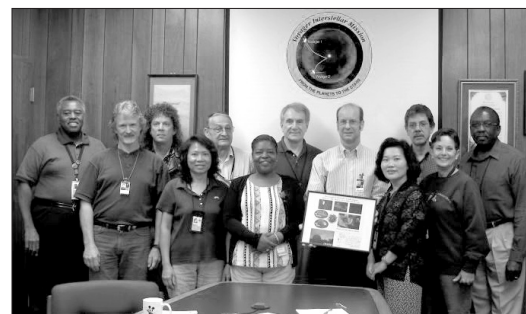
Peter, DB2OS

AMSAT-DL President

Oscilloscope trace of Voyager signal.



JPL Voyager Flight Team,



AMSAT-UK Beginners Workshop a Great Success

AMSAT-UK has held Beginners Workshops at their Annual Colloquium in Guildford, England for 20 years. One of the first of the Beginners Sessions is mentioned in the June 1988 issue of the RSGB journal, RadCom.

These workshops aim to show newcomers how to get started in the exciting world of amateur satellite communications. Many are amazed to discover that they can communicate through amateur satellites or speak to astronauts onboard the International Space Station using little more than a handheld dual-band FM transceiver.

In 2002 a new amateur license structure was introduced in the UK, which is comprised of three levels:

- Foundation – No direct US equivalent, just below Tech – gives access to all bands from 136 kHz to 440 MHz 10 watts maximum.
- Intermediate – technical level almost the same as US General – all bands 50 watts maximum
- Advanced – similar technical level to US Advanced – all bands 400 watts maximum

However, the UK Regulator denied Intermediate and Foundation licence holders the use of amateur satellites despite the fact that they could use the same frequencies for terrestrial working. As a result there was a significant drop in the numbers coming into this branch of the hobby.

AMSAT-UK campaigned to have access to the amateur satellite service available to all

amateurs and the UK Regulator first agreed to give Intermediate holders access and then in December 2006 gave full access to Foundation holders as well.

The results of this liberalization were clear to see at this year's Beginners Workshop with a sharp increase in the numbers of Foundation and Intermediate licensees attending.

Among the many new attendees were six members of the University of Surrey (UoS) Electronics and Amateur Radio Society (EARS) all Foundation or Intermediate holders. The Society's Chair Bea Smith had only recently passed her Foundation and was still awaiting her call sign.

We look forward to hearing all those who took part in the workshop on the satellites.

RSGB Article - Getting Started on Amateur Radio Satellites

<http://www.uk.amsat.org/content/view/408/168/>

University of Surrey Electronics and Amateur Radio Society (EARS)

<http://union.surrey.ac.uk/ears/doku.php>

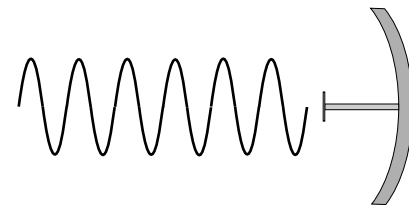
AMSAT-UK publishes OSCAR News, which is full of amateur satellite information.

You can join online at <https://secure.amsat.org.uk/subscription/> or contact the secretary

Jim Heck, G3WGM, Tel: + 44 (0)1258 453959

Email: g3wgm@amsat.org

Web: <http://www.uk.amsat.org/>



JPL Acknowledges Voyager Reception at Bochum

In March 2006 the Voyager-1 interstellar probe was received by the AMSAT-DL/IUZ team using the 20m dish in Bochum, Germany. Imagine that Voyager 1 is the furthest object away from earth built by humans. Voyager's distance from earth now exceeds 100 AU.

http://www.amsat-dl.org/index.php?option=com_content&task=view&id=62&Itemid=151

A reception report including a poster was sent to the JPL team and a few days ago we received the following e-mail, together with a nice picture of the Voyager Flight Team and our reception report in their hands.

"On June 6, 2007, the Voyager Flight Team opened the photo we received in the mail from you. Congratulations on your successful downlink acquisition of Voyager 1 at your 20-meter tracking station. Acquiring such a distant object is a remarkable achievement, especially for an amateur team. Thank you very much for your interest in Voyager.

"As a token of our appreciation, please find the attached photo of our team. Voyager Flight Team Members are, from left to right, Mr. Ed Massey - Project Manager, Steve Howard - Ground Data Systems Engineer, Thomas Weeks - Attitude Control Sensors Engineer, Regina Wong - Science Processing, Larry Zotarelli - Sequence Engineer, Pearline Johnson - Finance, Jim Jaeger - Data System Engineer, Roger Ludwig - Telecom & Sequence Integration Engineer, Sun Matsumoto - System Lead & Fault Protection Engineer, Enrique Medina - Attitude Control & Electrical Power Engineer, Glenda Sherman - Secretary, Jefferson Hall - Mission Director.

Sincerely,

Roger Ludwig

on behalf of the Voyager Flight Team"

The picture can be found here:

article continues at left on page 30 ...



New Amateurs from EARS with GB4FUN

Some of the new radio amateurs attending the Colloquium standing outside the RSGB radio communications van GB4FUN.

From left to right are Jon Phillips, M3UJO; Nandan Patel, M3UNP; Saleem Mohammed, Bea Smith, Victor Nikolaidis, 2E0VNN; Ubong Ukommi, M3UIU. Picture taken by Trevor, M5AKA.





Been thinking about working some birds?



Icom 910H **The perfect satellite rig**

Now that summer's on the way out, it's the perfect time to think about getting back to the shack and trying something way out. Work the amateur satellites - the OSCARs!

In 1961* the first amateur satellite, OSCAR 1, orbited Earth for nearly a week, putting ham radio right in step with the space age! In recent years, AMSAT® has launched some exciting amateur "birds" for the use of amateurs worldwide. The IC-910H is the perfect radio for satellite operation through new satellites such as ECHO, AO-51, and VUSat, AO-52!

OSCAR	Mode	Frequencies
AO-51	FM/PacSat	10m**/2m/70cm/23cm/12cm
AO-52	Linear (CW/SSB)	70cm/2m

Visit your Icom dealer today!

Free literature: 425.450.6088

or www.icomamerica.com

AMATEUR | AVIONIC | LAND | MOBILE | MARINE | RECEIVER | SYSTEM

ICOM®